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Informal Hierarchy:

An Investigation into the Antecedents and Consequences

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CHAPTER 1

General Introduction

Hierarchies are a ubiquitous feature of groups and teams (Anderson & Brown, 2010; Leavitt, 2004). Even in groups that are formally designed to be egalitarian, such as autonomous or self-managing teams, informal influence differences naturally emerge (Diefenbach & Sillince, 2011; Magee & Galinsky, 2008). Some scholars even argue that the tendency for groups to hierarchically organize is inescapable, because people are hardwired to engage in social interactions that create inequality (Gruenfeld & Tiedens, 2010). That is, when one group member takes the lead, acts dominant, or exerts influence in a given interaction, another group member will automatically match this behavior with followership, submission and deference (Sadler & Woody, 2003; Tiedens & Fragale, 2003). As such, despite potential intentions to do otherwise, people are inclined to establish hierarchically differentiated relationships that become the blueprint for how they interact and collaborate in the group setting.

Although informal hierarchies are practically universal, there is substantial variation in the degree of hierarchy that characterizes groups (e.g., Bunderson, Van der Vegt, Cantimur, & Rink, 2016; Cantimur, Rink, & Van der Vegt, 2016). That is, some groups have informal hierarchies in which all group members are clearly ranked and influence flows from top to bottom throughout the hierarchy, whereas other groups have more egalitarian structures in which group members can influence each other. Given the differences in hierarchical organization across groups, it is essential to understand when and why some groups have stronger informal hierarchies than others, and how these different hierarchies relate to key group outcomes.

Interestingly, the current literature offers divergent perspectives on the role of groups' informal hierarchy. On the one hand, functionalist scholars view hierarchies as vital

organizing structures of social order. Scholars associated with this view postulate that strong hierarchies fulfill people's need for structure and clarity, by providing a clear division of labor within the group (Halevy, Chou, & Galinsky, 2011). In doing so, strong hierarchies help groups to structure their coordination efforts, reduce conflict, and increase groups' performance outcomes (Bunderson et al., 2016; Halevy, Chou, Galinsky, & Murnighan, 2012; Ronay, Greenaway, Anicich, & Galinsky, 2012). On the other hand, the conflict perspective posits that people generally dislike strong hierarchies and prefer more egalitarian influence structures (Gruenfeld & Tiedens, 2010). Strong hierarchies would create feelings of inequality and injustice, and instill conflict over rank positions. These conflicts distract groups from their main tasks, as such hurting coordination and reducing overall group performance (Greer, Van Bunderen, & Yu, 2017; Greer & Van Kleef, 2010).

Although this theorizing and research has produced important insights, I believe there are two key problems that restrain our theoretical understanding of informal hierarchies. First, even though research on informal hierarchies has burgeoned over the past decade, the majority of studies so far has focused solely on consequences. As such, little is known about when and why groups develop stronger or weaker informal hierarchies. This is not to say that no scholarly work has focused on predicting factors, however, the existing literature on this topic is mostly conceptual in nature (Pearce & Conger, 2003; Vandewaerde, Voordeckers, Lambrechts & Bammens, 2011, but see Carson, Tesluk & Marrone, 2007). Second, even though researchers generally acknowledge that informal hierarchies may be consequential for a number of group outcomes, both theory and findings on the actual effects remain contradictory. Indeed, some studies have shown that informal hierarchies positively relate to crucial outcomes such as group and organizational performance (e.g., Bales, Strodtbeck, Mills, & Roseborough, 1951; He & Huang, 2011; Ronay et al., 2012), whereas other studies found that groups prefer more egalitarian structures and this equality stimulates groups'

collective intelligence and success (Bloom, 1999; Woolley, Chabris, Pentland, Hashmi, & Malone, 2010). These conflicting views highlight the need for a more integrative perspective that better explains under which conditions informal hierarchy may be beneficial or detrimental; and that clarifies for which specific outcomes informal hierarchies are helpful or harmful.

In the present dissertation, I aim to address these issues. I focus on both antecedents and consequences of informal hierarchy strength, adopting various theoretical perspectives to outline when and why informal hierarchies occur and how they relate to key group outcomes. Specifically, in Chapter 2, based on reasoning from the functionalist perspective, I examine the role of formal group leadership as an important antecedent of informal hierarchy strength, while also demonstrating when this relationship is more or less apparent. Second, to sort out the ambiguity around informal hierarchy's relationship with outcomes, I study key moderators of the informal hierarchy strength-team performance relationship in Chapter 3. Additionally, in Chapter 4, I focus on team creativity as an alternative outcome variable. As such, the empirical chapters together provide a more nuanced and comprehensive understanding of the nomological network around informal hierarchy.

In this introductory chapter, I will start by providing definitional clarity on the construct of informal hierarchy, discuss different conceptualizations in the current literature, and provide a summary of the theoretical developments regarding the functionalist and conflict account. I conclude the general introduction with an overview of specific research gaps and describe how this dissertation will address these issues.

Informal Hierarchy: Definition and Conceptualization

Hierarchy is commonly defined as "an implicit or explicit rank order of individuals with respect to a valued social dimension" (Magee & Galinsky, 2008, p. 354). This definition includes all kinds of hierarchies, from formal to informal, and from hierarchies of merit to

hierarchies of dominance. These various sources of differentiation signal differences between members in their control over resources, or in the prestige, respect, and deference that they receive from one another (Cantimur et al., 2016). In the present dissertation, I focus on informal influence hierarchies in particular, because influence is the downstream consequence of several underlying social dimensions that can be the reason for differentiation. Specifically, group members can become influential because of their formal position, their performance, dominance, gender, age, tenure, or a combination of all these aspects (Berger, Rosenholtz, & Zelditch, 1980; Bunderson, 2003). What matters in the end is that, irrespective of which of these dimensions is important in a given group or situation, the ultimate outcome is the giving or receiving of influence (for similar reasoning, see Anderson, Willer, Kilduff, & Brown, 2012; Ridgeway & Correll, 2006). Put differently, by focusing on influence differentiation, I am able to capture the informal hierarchy that is the summary of the different underlying reasons of why people potentially differentiate

Hierarchy as Inequality. Prior research has conceptualized informal hierarchy in a variety of ways. Most studies within the management and organization literature have adopted an inequality approach (Bunderson et al., 2016; D'Innocenzo, Mathieu & Kukenberger, 2016). This conceptualization is based on the notion of influence as an individual-level phenomenon, meaning that some individuals have a lot of influence (independent of others), whereas other individuals have less. A groups' informal hierarchy strength then represents the size of these influence differences between individual group members.

Scholars adopting this inequality perspective operationalize inequality in various ways. The first and most widely used operationalization of inequality is centralization (e.g., Argote, Turner, & Fichman, 1989; Berdahl & Anderson, 2005; Huang & Cummings, 2011), defined as the extent to which influence (or some other valued social dimension) is concentrated in only one or a few individuals (Freeman, 1978). A highly centralized informal

influence hierarchy has one informal leader that clearly stands out in terms of influence, and a number of other individuals who have considerably less influence and adopt informal follower roles (Harrison & Klein, 2007).

A second way in which scholars have operationalized influence inequality is by studying a group's informal hierarchy steepness (e.g., Cantimur et al., 2016; Greer & Van Kleef, 2010). Steepness is defined as the aggregated size of the differences between adjacently ranked individuals in a hierarchy (de Vries, Stevens, & Vervaecke, 2006). In other words, an informal influence hierarchy is steep when group members score very differently in terms of their influence level, on average, whereas an informal hierarchy is flatter when group members' scores are more equal (Harrison & Klein, 2007).

Lastly, whereas centralization and steepness represent the degree of *in*equality, some scholars have also captured the degree of equality in a group by focusing on the concept of shared leadership. This construct captures the extent to which leadership or influence emanates from and is shared by all group members (Carson et al., 2007; Pearce & Conger, 2003). Shared leadership is considered to be high when all group members demonstrate leadership behaviors (e.g., take charge, make decision, exert influence), while shared leadership is low when all members demonstrate little leadership.

Hierarchy as the Structure of Influence Relations. Although the inequality approach is informative, it fails to recognize that influence is inherently a relational phenomenon, meaning that one group member can only have influence when there are other group members to have influence over (Emerson, 1962). Put differently, to be an informal leader requires the presence of at least one follower. As such, attempts to capture the overall informal hierarchy by focusing on the influence levels of individual members are incomplete because such methods cannot capture the relational intricacies that ultimately define hierarchy (Bunderson et al., 2016; D'Innocenzo et al., 2016). Building from the field of ethology and social

networks (Chase, 1980; Krackhardt, 1994), this dissertation therefore advances a view of hierarchy as the overall structure of a groups' dyadic informal influence *relations* – not the aggregate of differences in individual influence level.

Following this conceptualization, a group is considered to be more hierarchical when the structure of influence relations is linear (i.e., transitive). This is the case when, for example, group member A is influential over member B, member B is influential over C, and member C is not influential over A (Chase, 1980; Everett & Krackhardt, 2012). In this situation, influence flows from top to bottom throughout the informal hierarchy, and there is no potential for the influence to flow back upward. Extrapolating this to larger groups of people, in hierarchical groups "influence relations … are cascading and, like water cascading over rocks, never flow upstream" (Bunderson et al, 2016, p. 1268). When, in the previous example, member C would be influential over member A, however, the overall structure of dyadic influence relations would be circular (i.e., intransitive), violating the principle of downward influence that characterizes strong informal hierarchies (Chase, 1980; Krackhardt, 1994). Put differently, member C, who in the first example was a low-ranking individual in a strong informal hierarchy, is now equally influential as member A or B, and this influence circle reduces the overall strength of the informal hierarchy.

Importantly, this conceptualization of informal hierarchy may lead to different conclusions about a group's hierarchical organization compared to the inequality approach. Consider a group in which all members are relatively (although not exactly equally) influential. According to the inequality approach, this group would be characterized by low centralization (there is no group member that really stands out in terms of individual influence), low steepness (the size of the difference between the influence scores is relatively small), and high shared leadership (all group members demonstrate relatively high levels of leadership). Yet, this group can still be strongly hierarchical in terms of linearity or

transitivity, when the influence relations between its members are structured in a linear or transitive manner. That is, if member A is influential over member B (even though both have relatively high levels of influence), the relationship between them is clearly hierarchical. Furthermore, when member B is then influential over member C, the triad is characterized by clear hierarchy in which collective decisions ultimately lie in the hands of member A. Hence, by conceptualizing hierarchy as the overall structure of dyadic influence relations, I am able to capture where group authority really lies, and how influence flows from the informal group leader down to the individual who is in essence the follower. As such, the dyadic method allows for a precise depiction of how influence is structured and gives an accurate indication of how hierarchical a group really is.

Prior Research on the Antecedents of Informal Hierarchy

Prior research on the antecedents of informal hierarchy is scarce. Most attention to this topic comes from the field of shared leadership and is mainly conceptual (Burke, Fiore & Salas, 2003, Day Gronn & Salas, 2004; but see Carson et al., 2007). Specifically, this literature highlights a number of potential factors that may increase a group's shared leadership, with particular emphasis on the importance of formal group leadership. That is, scholars argue that formal leaders have the ability to shape group processes in a way that motivates (or unmotivates) group members to demonstrate informal leadership behaviors (Manz & Sims, 1987; Pearce & Conger, 2003). In doing so, formal leaders potentially have profound implications for how informal leadership emerges and gets distributed in across group members. This work suggests, for instance, that formal leaders can foster a sense of self-competence among group members and encourage them to share their opinions and make decisions, as such increasing leadership behaviors among the entire group (Houghton, Neck & Manz, 2003). One empirical study seems confirmatory of this notion, showing that formal leaders who act as supportive coaches towards their group increase overall shared leadership

(Carson et al., 2007). This line of work is important because it highlights important factors related to group's informal leadership behaviors. Yet, it should be noted that shared leadership is related to, but distinct from informal hierarchy. Specifically, shared leadership captures when and why group members collectively engage in leadership behaviors, whereas informal hierarchy is concerned with how dyadic relations are structured such that influence flows throughout the group in a hierarchical manner (Denis, Langley, & Sergi, 2012; D'Innocenzo et al., 2016). Nevertheless, the conceptual advancements in the field of shared leadership may provide a first step in uncovering when and why informal hierarchies emerge.

Another line of work that may shed some light on when and why groups develop stronger or weaker informal hierarchies is the experimental work by Bales and colleagues in the 1950s. These studies mainly focus on the notion that certain hierarchical patterns (e.g., high centralization) are more effective than others for improving group outcomes (Bales et al., 1951). Most interesting about these studies, however, is that they were conducted primarily in leaderless groups under the assumption that this is the situation in which informal hierarchies emerge most strongly (Fisek & Ofsche, 1970; Heinicke & Bales, 1953). Indeed, these studies show that such groups on average develop quite strong informal hierarchies in which some individuals clearly stand out in terms of speaking time (as an indicator of their influence over others), whereas other members are more quiet and deferential.

Prior Research on the Consequences of Informal Hierarchy

The Functionalist Perspective. One of the primary theoretical perspectives that has guided much of the research on informal hierarchy is the functionalist perspective. As the name suggests, scholars from this line of thought argue that informal hierarchies emerge frequently because of their functionality, and they propose a positive pathway form informal hierarchy strength to group outcomes (Halevy et al., 2011; Keltner, Van Kleef, Chen, & Kraus, 2008). Specifically, strong informal hierarchies may provide groups with clarity on

how to structure and coordinate actions and give primacy to the opinions of the most influential members, as such avoiding conflict. By improving how group members work together, strong informal hierarchies in turn improve overall task performance (Anderson & Brown, 2010).

Empirical research at different levels of analysis supports this logic. At the individual level, for example, research demonstrates that people find it easier to learn and remember hierarchical stimuli (e.g., pictures of hierarchically shaped organizations) compared to egalitarian stimuli (e.g., pictures of egalitarian organizations; Zitek & Tiedens, 2012), and evaluate them as being more structured, predictable, and well-controlled (Friesen, Kay, Eibach & Galinsky, 2014).

At the dyadic level, studies between two interaction partners demonstrate that people have a natural tendency to develop differentiated relationships. That is, when one interaction partner acts dominantly, another automatically responds with submissive behavior and vice versa—an automatic behavioral response labeled dominance complementarity (Sadler & Woody, 2003; Strong et al., 1988). In fact, studies show that dominance complementarity in dyads is related to interaction satisfaction of both interaction partners (Dryer & Horowitz, 1997) and enhances task performance (Estroff & Nowicki, 1992). In sum, mutually recognized hierarchical differences are suggested to facilitate interpersonal coordination by giving primacy to the needs of higher-ranked individuals (De Kwaadsteniet & van Dijk, 2010; Keltner et al., 2008), helping dyads to make decisions and work together effectively.

Lastly, at the group level of analysis, research demonstrates that strong informal hierarchy may reduce process conflict, increase coordination, and enhance overall group performance (Bunderson et al., 2016; Halevy et al., 2012). Mirroring results from dyadic research, group-level empirical evidence shows, for example, that hierarchies help groups to make decisions in a peaceful and effective way by prioritizing the opinions and needs of the

higher ranked individuals (Van Vugt, Hogan, & Kaiser, 2008). Furthermore, members in egalitarian (i.e., non-hierarchical) groups tend to compete more strongly with each other and have difficulty reaching collective decisions (Groysberg, Polzer, & Elfenbein, 2011). Strong informal hierarchies allow members a clear picture of their place within the group and they clarify expectations about norms and behaviors related to these rank positions (Anderson & Willer, 2014; He & Huang, 2011). Especially when working on interdependent tasks, groups with a strong informal hierarchy may benefit from such role clarity and division of labor (Halevy et al., 2012; Ronay et al., 2012). In sum, there is convincing evidence that strongly hierarchical groups are better at integrating and aligning individual members' actions and knowledge towards the attainment of collective goals.

The Conflict Perspective. Despite evidence in favor of the functionalist approach, scholars have also pointed to the negative side of informal hierarchies. According to the conflict perspective (Greer et al., 2017), in particular, informal hierarchies instill conflict, hurt coordination, and reduce overall group performance for several reasons. First, larger inequality (scholars from the conflict perspective mostly adopt an inequality approach toward conceptualizing hierarchy) leads to social comparisons between group members of different ranks, and therefore damages group performance (Bunderson & van der Vegt, 2018; Siegel & Hambrick, 2005). Indeed, a number of empirical studies demonstrate that group members try to outperform one another to achieve higher-ranking positions within the informal hierarchy by engaging in status conflicts that distract them from their primary tasks (Bendersky & Hays, 2012; Greer et al., 2017; Yu, Greer, Halevy, & Van Bunderen, 2019).

Second, research demonstrates that people generally dislike strong informal hierarchies because such hierarchies give differential benefits to group members (Magee & Galinsky, 2008). That is, higher-ranked group members have privileged access to resources in a strong hierarchy, and they enjoy more status and respect compared to those lower in the

hierarchy (Anderson et al., 2012; Sherif, White, & Harvey, 1955). Importantly, these differences are often perceived as unfair and illegitimate (Friesen et al., 2014; Gruenfeld & Tiedens, 2010). Additionally, strong informal hierarchy may create an environment in which speaking time is distributed in favor of individuals at the top of the hierarchy, while lower-ranked members' contributions are suppressed (Berdahl & Martorana, 2006). These disruptive group processes may inhibit group members' ability to learn from each other (Bunderson, 2003; Edmondson, 2003) and lead group members to demonstrate harmful political behavior (Eisenhardt & Bourgeois, 1988).

Taken together, the evidence presented above provides a strong case for both the functionalist and conflict perspective. In fact, a recent meta-analysis reveals both beneficial and detrimental effects of hierarchy on group performance, via processes such as group coordination and conflict (Greer, De Jong, Schouten, & Dannals, 2018). Yet, the authors of this study also emphasize the current literature's one-sided focus on inequality approaches toward hierarchy, and note that much remains unknown about informal hierarchy conceptualized as dyadic influence relations.

Research Gaps and Present Approach

Considering the above literature overview, I identify and discuss three important avenues for research, which are the basis for the current dissertation.

Antecedents of informal hierarchy. Previous work has almost exclusively focused on the consequences of informal hierarchy strength, but relatively little is known about the origins. To the extent that work has focused on hierarchy's predictors, this work is mostly conceptual in nature and has not systematically investigated variations in formal leadership. Given the pivotal role of informal hierarchies for group functioning, it is clear that knowledge is urgently needed on antecedent factors that shape a group's degree of informal hierarchical differentiation. Nevertheless, the existing research has rarely considered groups' informal

hierarchy as an outcome variable (Ravlin & Thomas, 2005), leaving both scholars and practitioners with several unanswered questions. Early work on hierarchical differentiation in the 1950's has suggested that informal hierarchies are particularly pronounced in groups that lack formal leadership structures (Bales et al., 1951; Heinicke & Bales, 1953). Other scholars have also pointed to a strong link between formal and informal aspects of a group's hierarchical differentiation (Diefenbach & Sillince, 2011; McEvily, Soda, & Tortoriello, 2014). Yet, none of the previous work has systematically investigated the relationship between formal leadership and informal hierarchy strength.

Chapter 2 of the present dissertation addresses this issue. Drawing from the functionalist perspective (Halevy et al.,, 2011; Magee & Galinsky, 2008), I propose that formal leadership shapes the extent to which groups hierarchically differentiate. Scholars from the functionalist view postulate that informal hierarchies emerge because they fulfil people's fundamental need for structure and certainty (Friesen et al., 2014; Halevy et al., 2011). Drawing on that logic, I argue that groups will differentiate more strongly when their need for structure is threatened, which may happen in the absence of strong formal leadership. Furthermore, I introduce task complexity as an important moderator of the formal leadership-informal hierarchy strength relationship. High task complexity represents a situation in which the structuring function of either formal leadership, or informal hierarchy, is most needed (Rousseau & Aube, 2010). As such, I propose that the relationship between formal leadership and informal hierarchy strength will be strongest when groups work on complex tasks.

This chapters employs a multi-method set of studies to test the above propositions. By using both an experimental manipulation of formal leadership and by measuring formal leadership in two field settings, this chapter shows that formal leadership and informal hierarchy are causally and non-reciprocally related. Specifically, groups with stronger (i.e., more directive) formal leaders exhibit weaker informal hierarchies; whereas groups with

weaker formal leaders exhibit strong informal hierarchies. Lastly, in a field study among real-life organizational teams, this chapter demonstrates that the formal leadership-informal hierarchy strength linkage is moderated by task complexity, such that this relationship only occurs under relatively high task complexity. By doing so, this is one of the first set of studies to systematically investigate predictors of informal hierarchy strength.

Informal hierarchy strength and group performance. Second, the above literature overview demonstrates the coexistence of potential positive and negative links between informal hierarchy strength and group performance. That is, both the functionalist and conflict account have been supported by empirical findings, suggesting that the effects of informal hierarchy strength may hinge on moderating factors. As such, research is needed that reconciles these contradictory perspectives, by demonstrating in which situation the positive or the negative pathway takes primacy. One plausible explanation of the equivocal results is that the different perspectives build on different assumptions regarding how influence differences originate from the group. That is, functionalist scholars assume that influence differences within informal hierarchies are built on performance levels of individual members, whereas scholars from the conflict account implicitly suggest that influence differences are more often based on member dominance. Yet, to date there has been little systematic treatment of the origins of influence relationships (see Tarakci, Greer, & Groenen, 2016 for an exception).

Accordingly, chapter 3 of this dissertation identifies and tests critical assumptions on the origins of influence underlying the functionalist and conflict perspectives. Specifically, as the functionalist theory assumes that the highest performing group members gravitate to positions of influence, the informal hierarchy takes shape such that the highest performing member has the most influence, the second highest performing member occupies the second ranked position, and so forth. In sharp contrast, the conflict theory assumes that influence is

not necessarily meritoriously distributed. In fact, scholars from this perspective assume that the most dominant group members will claim (and receive) superior influence, while more submissive individuals show deference (Cheng, Tracey, Foulsham, Kingstone, & Henrich, 2013). As such, an informal hierarchy forms in which the most dominant group member is also the most influential, the second most dominant group member is second ranked, down to the least dominant member who is lowest ranked. In sum, during the formation process of informal hierarchies, influence becomes aligned with performance or dominance, and this difference may turn out to shape informal hierarchies relation to team performance.

In a large field study among real-life teams, this chapter demonstrates that the relationship between informal hierarchy strength and group performance indeed hinges on performance alignment. That is, in line with functionalist thinking on the benefits of informal hierarchies, I find that under high performance alignment (i.e., the highest performing members have the most influence, and lower performing members have less influence), the informal hierarchy-group performance relationship is positive. Contrary to expectations, the study reveals no significant moderating effect for dominance alignment. Interestingly, however, I find that dominance alignment is directly negatively related with group performance, supporting the notion that hierarchies with dominant individuals at the top hurt overall performance.

Informal hierarchy strength and team creativity. Third, the above literature overview signifies a one-sided focus on a certain type of group outcomes. That is, most of the literature has focused predominantly on task performance. Importantly, however, there are other outcomes that are also important, if not crucial, for groups to achieve overall success. One such outcome is creativity (Amabile, 1988; Zhang & Bartol, 2010). Importantly, researchers suggest that reaching high creative performance requires markedly different group inputs compared to efficient and routine task performance (Ford, 1996; Madjar, Greenberg, & Chen,

2011). That is, routine task performance requires groups to engage in standardized and largely habitual actions. In contrast, creative outputs require active retrieval and processing of information and the development of new perspectives and ideas. The literature on informal hierarchy's consequences has so far not incorporated these issues into work on hierarchy's consequences.

Chapter 4 of this dissertation addresses this issue by focusing on informal hierarchies' relation with group creativity. Based on the Motivated Information Processing in Groups (MIP-G) model, I propose that informal hierarchy strength, although positive for many group outcomes, will stifle team creativity. The MIP-G model posits that groups are most creative when they are motivated to engage in deliberate information processing (Bechtoldt, De Dreu, Nijstad, & Choi, 2010; De Dreu, Nijstad, Bechtoldt, & Baas, 2011). This type of information processing is characterized by the systematic and effortful evaluation of available and new information regarding the group's tasks or goals. Current knowledge on how informal hierarchy may affect group processes and performance (e.g., the functionalist perspective; Halevy et al., 2011) suggests, however that groups may have difficulty engaging in such processes under strong informal hierarchy. As such, I propose that informal hierarchy may be negatively related with team creativity. Importantly, however, groups are not characterized by their informal hierarchy alone. Most often, groups have a formal leader that may or may not encourage creativity-related processes among group members. This chapter therefore also focuses formal leadership style, arguing that when formal leaders act in empowering ways, groups with strong informal hierarchies may still be able to reach creativity because of the leader's encouragement. Hence, I argue that the negative relationship between informal hierarchy strength and team creativity will disappear under high empowering leadership.

I test this proposition in a field study among a wide range of organizational teams. Results support the propositions, showing that informal hierarchy strength is negatively

related with team creativity under low empowerment from the formal leader. When formal leaders do act in empowering ways, however, this negative relationship disappears.

Lastly, chapter 5 of this dissertation provides an overall summary, presents theoretical and practical contributions, and suggests important avenues for future research. Finally, I would like to note that chapter 2, 3 and 4 are written as independent papers, and therefore each chapter can be read separately from the rest of the thesis.

CHAPTER 2

On the origins of informal hierarchy: The interactive role of formal leadership and task complexity

Abstract

Informal hierarchies are a common and important feature of many groups, yet we know little about the antecedent conditions that determine the strength of such hierarchies. Building on theory that has depicted hierarchy as a mechanism for reducing uncertainty and creating structure, we posit that informal hierarchies emerge most strongly in situations that are ambiguous, ill-defined and unstructured. Three independent studies confirm this notion, demonstrating that groups develop particularly strong informal hierarchies in situations characterized by both a lack of strong formal leadership and high task complexity. These findings support the theoretical notion that formal and informal hierarchies are closely related, but only under conditions of high task complexity in which the structuring functions of hierarchies are most crucial.

This chapter is based on Oedzes, J.J., van der Vegt, G.S., Rink, F.A., & Walter, F. (2019). On the origins of informal hierarchy: The interactive role of formal leadership and task complexity. ***Journal of Organizational Behavior***, *40*(3), 311-324.

CHAPTER 2: ON THE ORIGINS OF INFORMAL HIERARCHY

Informal hierarchical differentiation is a pervasive feature of human groups (Leavitt, 2004; Mazur, 1985; Van Vugt, 2006) that materializes across widely differing contexts, ranging from groups of preschool children (Strayer & Strayer, 1976) to organizational top management teams (He & Huang, 2011). Even in the absence of formal power and authority structures, informal influence differences between a group's members emerge on a regular basis (Bales et al., 1951; Heinicke & Bales, 1953), enabling more influential members to change others' behavior, direct group activities, and distinctly shape a group's functioning (Anderson & Brown, 2010; Mowday, 1978).

Despite the near ubiquity of informal group hierarchies, research has shown that the strength of informal hierarchical differentiation varies widely, with some groups exhibiting more pronounced and clear-cut influence differences between their members than others (Bunderson, et al., 2016; Schmid Mast, 2002). This raises important questions about the antecedent conditions that may shape a group's informal hierarchy strength. Existing research has rarely considered this issue (Ravlin & Thomas, 2005). So far, individual-level studies have investigated members' informal influence or leader emergence (e.g., Anderson, John, Keltner, & Kring, 2001; Walter, Cole, Van der Vegt, Rubin, & Bommer, 2012), and group-level research has examined factors that predict a group's average degree of informal or shared leadership (e.g., Carson et al., 2007; D'Innocenzo et al., 2016; Pearce & Conger, 2003). Although these studies have produced important insights, they have typically focused on the extent to which leadership roles are distributed among a team's individual members (D'Innocenzo et al., 2016). As such, this research has not investigated how groups develop distinct patterns of informal hierarchical strength, denoting how a group, as a whole, is characterized by its members' *dyadic influence and deference relations* (cf. Bunderson et al., 2016; Oedzes, Rink, Walter & van der Vegt, 2018; Krackhardt, 1994). For example, even if informal leadership roles are shared between individual members, a group may exhibit either

a relatively weak (if most members' dyadic influence relations are reciprocal) or a relatively strong informal hierarchy (if most members' dyadic influence relations are unidirectional; Bunderson et al., 2016). In the former case, most of the team's members would mutually influence each other, such that the group exhibits little informal hierarchical differentiation. In the latter case, by contrast, the group's informal leadership pattern would exhibit a more clear-cut ordering; even though most members may take part in the leadership process, their informal influence relations follow a more hierarchical, top-down pattern.

This study draws from theory that has cast hierarchy as a functional mechanism for uncertainty reduction (Halevy et al., 2011; Magee & Galinsky, 2008) to examine why groups may differ in the strength of their informal influence hierarchies. This theoretical perspective holds that (informal) group hierarchies typically arise because they reduce ambiguity and offer clarity regarding members' roles, positions, and responsibilities (De Kwaadsteniet & van Dijk, 2010; Friesen et al., 2014; Tiedens, Unzueta, & Young, 2007). Building on this conceptual backdrop, we propose that a strong informal hierarchy is particularly likely to develop if other means cannot accommodate a group's need for structure and predictability.

In organizational practice, groups' respective needs are often met by imposing a clear-cut *formal* hierarchy, such that a formal leader (e.g., a supervisor) is equipped with authority to direct group members' behavior, assign roles to individual members, and monitor their efforts and performance (Lorinkova, Pearsall, & Sims, 2013; Sagie, 1996; Somech, 2006). Interestingly, however, much of the existing research on informal hierarchies has been conducted in groups without a formal leader (e.g., Bales et al., 1951; Fisek & Ofsche, 1970). Hence, although scholars have rarely examined this notion, a group's tendency toward strong informal hierarchical differentiation may be most pronounced if the group has no formal leader.

At the same time, focusing on the mere presence or absence of a formal leader may not be sufficient to explain a group's informal hierarchy strength. It is well established in the leadership literature that formal leaders differ markedly in their behavior toward subordinates (i.e., their leadership style; Yukl, 2013). Hence, some formal leaders' behavior may more effectively create structure and clarity within the group than other leaders' behavior, and these differences appear critical for understanding formal leaders' roles for their groups' informal hierarchies. Again drawing from functional theories of hierarchy (Friesen et al., 2014; Halevy et al., 2011), we propose that a group's need for predictability and order is more likely to be met when the formal leader provides clear-cut directions for joint task accomplishment (i.e., a highly directive leadership style; Lorinkova et al., 2013). When the formal leader grants greater autonomy and leaves more discretion for members' task accomplishment (i.e., a less directive leadership style), by contrast, group members may strive to reduce the resulting ambiguity by self-organizing their collaboration, thus establishing more pronounced informal influence differences.

Importantly, this argument rests on the assumption that a group experiences salient uncertainty and thus requires clear-cut structures and processes to accomplish its tasks. It is evident that this assumption is not equally valid for all groups, but may hinge on a group's task characteristics (Lord, 1976). Under simple task conditions with unambiguous procedures and solutions, it is relatively easy for group members to know what is expected of them and of others, and members face few problems that require complex coordination (Withey, Daft, & Cooper, 1983). With more complex tasks, however, groups require clear internal structures to deal with their work's greater ambiguity (Rousseau & Aube, 2010; Withey et al., 1983). Consequently, we cast task complexity as a critical boundary condition for the link between formal leadership and informal hierarchy strength.

In summary, the present set of studies aims to shed new light on the antecedents of groups' informal hierarchical structuring and, more specifically, to advance our theoretical understanding of the formal leadership-informal hierarchy linkage. As Diefenbach and Sillince (2011, p. 1532) argued, investigating "formal *and* informal hierarchy (and their relationships) at the same time helps us to understand hierarchy, its mechanisms and dynamics in more differentiated ways." In this research, we propose that the absence of strong formal leadership may, somewhat ironically, trigger tendencies toward stronger informal hierarchical differentiation. Moreover, our studies highlight the important functional role of informal group hierarchies by demonstrating that such hierarchies are most pronounced in situations that require clearly structured and well-coordinated influence relationships between a group's members due to both a lack of (directive) formal leadership and high task complexity. Taken together, our findings illustrate that formal leaders' role for their groups' informal influence structure is intricate and context-dependent.

Theory and Hypotheses

Informal Group Hierarchy

Studies on informal group hierarchy have been conducted within various research areas and literature streams (Magee & Galinsky, 2008). One common perspective within the management and organization literature is the inequality approach, which conceptualizes a group's informal hierarchy strength as the overall degree of differentiation between its members' influence levels (Bunderson et al., 2016). Studies following this perspective have drawn on individual members' overall influence in the group to operationalize this construct, capturing either the disparity of influence among a group's members (e.g., the standard deviation of individuals' influence scores; Greer & Van Kleef, 2010) or the concentration of influence within one or a few members (e.g., using the Freeman index; Bunderson, 2003). Although this approach is informative, scholars have noted that it cannot address a crucial

aspect of informal hierarchical differentiation, namely that a focal member can only have influence when there is another member who shows deference (Bunderson et al., 2016). Indeed, influence is not primarily a characteristic of an individual member, but a property of the dyadic relationship between two members (Emerson, 1962).

Based on this notion, ethologists and social network scholars have advocated an alternative, dyadic approach, conceptualizing informal hierarchy as the overall structure of the dyadic influence relations within a group (Chase, 1980; Everett & Krackhardt, 2012). A strong informal hierarchy exists, in this conceptualization, if members' dyadic influence relations are linear, such that influence exclusively flows in one direction throughout the group (i.e., if group member A has influence over member B, and B has influence over C, then A also has influence over C; Chase, 1980). In weaker informal hierarchies, the unidirectional flow of dyadic influence is disrupted (e.g., member C could have influence over A). This presence of intransitive (i.e., cyclical) influence relations reduces clarity about who dominates the informal hierarchy, such that lower-ranked members may exert influence over some otherwise higher-ranked individuals (Chase, 1980; Mazur, 1985). For the present purposes, we adopt this dyadic approach because it more accurately captures the uncertainty-reducing potential of informal hierarchies in groups (Bunderson et al., 2016).

The near omnipresence of informal influence hierarchies in groups has led scholars to suggest that hierarchies fulfill pivotal functions for both individual members and the group as a whole (Anderson & Brown, 2010; Halevy et al., 2011). Specifically, this theorizing suggests that informal hierarchies serve to meet members' fundamental need for structure by reducing uncertainty regarding group members' social interactions and joint task accomplishment (De Hoogh, Greer, & Den Hartog, 2015; Gruenfeld & Tiedens, 2010; Tiedens et al., 2007). Various streams of empirical research have, accordingly, directly or indirectly illustrated this structuring function of hierarchical differentiation. At the individual level, for example,

people report an increased preference for hierarchical structures when their sense of personal control is threatened (in an effort to restore perceptions of environmental structure, safety, and predictability; Friesen et al., 2014). Furthermore, at the dyadic level, group members generally accept (and even appreciate) informal hierarchical relations between peers because such relationships clarify who leads and who follows, thus facilitating smooth interactions (Dryer & Horowitz, 1997; Tiedens et al., 2007). Relatedly, on the group level, informal hierarchy is negatively related to groups' process conflict and positively related to members' coordination efforts (Bunderson et al., 2016; Klein, Ziegert, Knight, & Xiao, 2006). Together, these studies indicate that strong hierarchical structures can help individuals, dyads, and groups clarify key interaction norms and promote joint work processes (Clark, Clark, & Polborn, 2006; De Kwaadsteniet & van Dijk, 2010).[1] Building on this theoretical and empirical backdrop, we propose that strong informal group hierarchies are particularly likely to develop in work situations that are ill-defined, ambiguous, and do not offer alternative ways to clearly structure members' interactions and tasks. By contrast, a group's informal hierarchy strength should be less pronounced in situations that offer alternative means of guiding members' interactions and establishing certainty and clarity.

Formal Leadership and Informal Hierarchy Strength

Several research streams have emphasized the relevance of formal leadership for structuring group interactions and creating a well-defined, predictable working environment. Scholars have argued, for example that formal leaders should provide guidance, specify working procedures, and assign clear-cut responsibilities to group members (House, 1996; McGrath, 1962; Morgeson, DeRue, & Karam, 2010; Katz & Kahn, 1966). Without such

[1] We note that although hierarchical structures may be functional in terms of structuring group processes, this does not mean that strong informal hierarchies are always beneficial for overall group performance. In fact, performance consequences of informal hierarchy strength appear contingent on a number of situational factors (e.g., group size, task complexity; Bunderson et al., 2016; He & Huang, 2011).

formal leadership, group members may experience uncertainty about how to interact and cooperate (De Hoogh et al., 2015), promoting their feelings of role ambiguity and role conflict (Rizzo, House, & Lirtzman, 1970; Schriesheim, House, & Kerr, 1976).

Interestingly, however, functional theories of leadership (e.g., McGrath, 1962; Morgeson et al., 2010) argue that structuring activities may also be performed by individual group members who take on an informal leadership role (i.e., without having formal leadership authority; Carson et al., 2007; Morgeson et al., 2010). Classical sociological experiments by Bales and colleagues (Bales, 1950; Bales et al., 1951; Heinicke & Bales, 1953) provide evidence for this argument, illustrating that in leaderless groups, members automatically engaged in interactions that lead to the emergence of a strong informal hierarchy (also see Burke, 1974; Fisek & Ofsche, 1970). Hence, although this notion has never been explicitly examined, research on formal and informal leadership emergence suggests that informal hierarchies may develop more strongly in groups without than in groups with a formal leader. In the absence of formal leadership, group members are likely to experience ambiguity about how to resolve coordination difficulties or conflicts, because there is no formal authority to turn to for help (De Hoogh et al., 2015). Thus, we hold that groups without formal leadership will seek internal solutions to cope with such difficulties. Establishing a strong informal hierarchy may represent an important means of achieving clarity and structure in such situations (cf. Halevy et al., 2011).

In the presence of formal leadership, by contrast, group members are less likely to experience ambiguity and uncertainty because they can ask their leader for guidance in case coordination issues or conflicts arise (Fleishman et al., 1991; Zaccaro, Rittman, & Marks, 2001). Hence, in groups with a formal leader, members should experience less need to resolve internal struggles themselves by organizing pronounced patterns of influence and deference (i.e., developing a strong informal hierarchy). In other words, the straightforward organization

a strong informal hierarchy provides is largely dispensable if groups can rely on their formal leader to facilitate joint task accomplishment. Accordingly, we hypothesize:

Hypothesis 1. Groups without formal leadership develop stronger informal hierarchies than groups with formal leadership.

Beyond the mere presence or absence of a formal leader, we further anticipate that a formal leader's typical pattern of behavior towards subordinates (i.e., his or her leadership style) may shape the degree of hierarchical differentiation in his or her group. One leadership style that is particularly concerned with the clear structuring of group activities is directive leadership. Specifically, directive leadership is defined as the extent to which leaders clearly specify group members' roles, provide directions for joint task accomplishment, and structure group interactions (Lorinkova et al., 2013). Hence, highly directive formal leaders fulfill important structuring functions for their groups, providing members with role-relevant directions and helping them integrate subtasks and orchestrate joint efforts (Muczyk & Reimann, 1987; Somech, 2006). Consequently, we expect that highly directive formal leaders leave little necessity for their groups to develop clear-cut hierarchical differences, such that informal hierarchies should remain rather weak.

With less directive leaders, in contrast, group members cannot rely on these formal organizing mechanisms and, thus, they have to find alternative ways to establish predictability in their work environment (Kahai, Sosik, & Avolio, 2004; Muczyk & Reimann, 1987). While giving freedom and autonomy to their subordinates, less directive leaders also leave considerable uncertainty on how to structure cooperation within their groups (Hmieleski & Ensley, 2007). Hence, these leaders may not sufficiently meet their groups' need for structure and certainty. Consequently, we anticipate the emergence of stronger informal group hierarchies as members strive to self-organize their collaboration.

Hypothesis 2. Formal directive leadership is negatively related to informal hierarchy strength.

The Moderating Role of Task Complexity

It is important to note that these hypotheses are based on the assumption that group members need to coordinate their activities to realize important group goals. Such requirements are most likely to arise in groups that perform relatively complex tasks. By definition, such tasks are multi-faceted and rather unpredictable, often comprising multiple subtasks that are interdependent and necessitate careful alignment (Campbell, 1988; Wood, 1986). Research has shown that groups facing more complex task conditions are more likely to encounter uncertainty on how to deal with their assignments and, hence, are more reliant on structuring mechanisms, as compared with groups facing simpler tasks (Espinosa, Slaughter, Kraut, & Herbsleb, 2007; Rousseau & Aube, 2010). We therefore anticipate the negative association between directive leadership and informal hierarchy strength to be more pronounced in teams with higher (rather than lower) task complexity.

As noted, a strong directive leader can offer orientation and guidance for the group (Lorinkova et al., 2013; Somech, 2006), which should be particularly important in high-complexity task settings. Strong directive formal leadership may resolve the ambiguity and uncertainty inherent in highly complex tasks, alleviating group members' need to seek for alternative, informal hierarchical coordination mechanisms despite such complexity. A less directive formal leader, in contrast, is likely to leave his or her group with considerable uncertainty in complex task settings, because he or she does not offer sufficient structure and predictability. Thus, group members may experience a salient need to self-organize their interdependent efforts. In this situation, a strong informal hierarchy is likely to develop as some members may try to take the lead whereas others willingly yield to such influence attempts to facilitate effective task accomplishment (Tiedens et al., 2007).

For groups with less complex tasks, by contrast, joint task accomplishment is relatively simple and does not require elaborate internal structuring (Withey et al., 1983). Thus, we would expect strong directive leadership to be superfluous in these situations. Even without such leadership, group members should find it relatively easy to discern appropriate task procedures and, in fact, they should be able to draw on readily available routines and procedures to structure group processes, rather than having to develop a distinct pattern of informal hierarchical differentiation (Withey et al., 1983). Hence, groups' informal hierarchy strength should remain limited even in the absence of directive formal leadership in groups with relatively non-complex tasks. We therefore hypothesize:

Hypothesis 3. Task complexity moderates the negative relationship between directive formal leadership and informal hierarchy strength. This relationship is more pronounced for groups performing more complex tasks than for groups performing less complex tasks.

Study Overview

This investigation employed three independent studies to test our hypotheses. The first two studies examined the role of formal leadership in relatively complex task settings (i.e., Hypotheses 1 and 2). Study 1 was a laboratory experiment to establish a causal link between the presence versus absence of formal leadership and informal hierarchy strength. Adding to this, Study 2 investigated the consequences of formal leaders' directive behavior for informal hierarchy strength in longer-term groups, enabling the examination of potentially reciprocal linkages between these variables over time. Finally, Study 3 investigated the link between directive formal leadership and informal hierarchy strength in real-life work groups (i.e., Hypothesis 2) and incorporated task complexity as a critical boundary condition to examine our full moderation model (i.e., Hypothesis 3).

Study 1—Method, Results, and Discussion

Design and Participants

Study 1 employed an experimental design to test Hypothesis 1. We manipulated the presence versus absence of formal leadership in experimental task groups using a one-factorial between-subjects design to examine the effects of formal leadership on the strength of groups' informal hierarchies. In the formal leadership condition, groups comprised an appointed leader and four subordinate members. In the no formal leadership condition, groups comprised four members without a formally appointed leader. Importantly, our subsequent analyses refer to the four group members without formal leadership authority across both conditions (i.e., formal leaders were excluded from the informal hierarchy analyses to avoid distortions) because our aim was to compare informal hierarchy strength in groups of formal peers.

A total of 41 groups participated in the experiment, consisting of 184 business and economics students who received either course credit or financial compensation for their participation. One group in the no formal leadership condition was omitted because members interacted for only five minutes, which was insufficient for serious task accomplishment and far below the other groups' interaction times (M = 10.14 minutes, SD = 1.57). Hence, the final sample consisted of 40 groups (20 per condition) comprising 180 participants. Forty-nine percent of the participants were female, their mean age was 22.38 years (SD =1.93) and the majority were Caucasian (83.3%, 15% Asian, 1.7% Hispanic).

Experimental Task and Procedure

Participants were invited to the laboratory in groups of four or five to work on NASA's "Lost on the Moon" task (Hall & Watson, 1970). In this task, participants act as a group of astronauts that has crash-landed on the moon and needs to return to the mother ship. To do so, the group has to arrive at a collective ranking of fifteen items salvaged from their damaged vessel in order of their importance for survival (e.g., oxygen tanks, nylon rope).

Before working on this group task, participants were individually seated in separate cubicles to sign an informed consent form, receive task instructions, and complete a leadership questionnaire. We used participants' answers to this questionnaire as part of the formal leadership manipulation. Lastly, participants prepared for the group discussion by individually ranking the fifteen survival items. Afterwards, group members were seated together in a collaboration room to work on the group task. Members were allowed to use their individual rank-order of survival items as input during the collective discussion. After the group task, participants returned to their individual cubicles to complete a post-task questionnaire that included measures of informal hierarchy strength along with demographic variables and manipulation checks.

Formal Leadership Manipulation

To manipulate the presence versus absence of formal leadership, we used a procedure developed by Galinsky, Gruenfeld, and Magee (2003). Across both experimental conditions, participants were informed (prior to the group task) that their role in the group was based on the outcomes of the pre-task leadership questionnaire. This was important (a) to ensure acceptance of the formally assigned leader in the group, and (b) to increase the realism of our study (after all, formal leaders in real-life work groups are typically endowed with legitimate authority as well; Yukl, 2013). Actually, however, the experimenter randomly assigned roles to the group members.

In the formal leadership condition, one of the members was appointed to the role of group leader, whereas the other four members were appointed the role of subordinate. The experimenter always chose male leaders to prevent differences in leaders' gender from biasing the results. Leaders and subordinates learned that the formal leader had control over work processes within their group as well as the authority to evaluate subordinates' performance and allocate bonus money accordingly (see Galinsky et al., 2003, p. 455). In the

no formal leadership condition, all members were assigned to the neutral role of a regular group member, and they received no further role instructions.

As a manipulation check, we asked all participants to indicate which role they had been assigned to (i.e., leader, subordinate, or group member). Nine participants across nine different groups answered this question incorrectly (four regular group members and five subordinates). Analyses with and without these nine groups yielded virtually identical results, so we decided to include all groups in the analyses.

Informal Hierarchy Strength

Consistent with previous research (Bunderson et al., 2016), we adopted a dyadic approach to measure members' influence and compute a groups' informal hierarchy strength (Schmid Mast, 2002; Singh, Singh, Sharma, & Krishna, 2003). We presented the four subordinate members in the formal leadership condition and the four regular members in the no formal leadership condition with a list of all possible member pairings. Subsequently, we asked these participants to indicate which individual in each pair was more influential during the group task. For each pair, the answer options were: (1) member A was more influential than member B; (2) member B was more influential than member A; and (3) members A and B were equally influential. To circumvent order-effects, pairs of group members were presented following Ross's (1939) ordering method.

The dyadic influence assessments were subsequently used to compute the overall strength of a group's informal influence hierarchy (cf. Chase, 1980), using linearity as a prominent indicator of informal influence differences within groups (Schmid Mast, 2002). Linearity indicates the degree to which informal hierarchical relationships in a group are transitive (i.e., do not include cyclical influence relations; Chase, 1980). As such, linearity is maximized if one member has influence over all others in the group, the second member has influence over all members but the first, down to the last member who has influence over no

one (Chase, 1980; Schmid Mast, 2002). Linearity is reduced to the extent that cycles occur within the informal hierarchical ordering, such that member A has influence over B, member B has influence over C, but member C has influence over A. Notably, we excluded group leaders in the formal leadership condition from these calculations. By definition, formal leaders were more influential than the other members due to their official leadership role. Hence, their inclusion would inflate informal hierarchy strength estimates in the formal leadership condition and make comparisons between conditions meaningless.

To calculate informal influence linearity, we created two influence matrices for each group (Chase, 1980). In the first matrix, each cell captured the percentage of participants that rated a specific group member as more influential than another member. In the second matrix, each cell captured the percentage of members that rated the influence relation between two specific members as tied. Adding these two matrices (with ties weighted as .5) resulted in a perfectly symmetrical informal influence matrix for each group. These added matrices served as input for calculating linearity scores for each group using Singh, Singh, Sharma, and Krishna's (2003) *h* index:

$$h = [12/(n^3 - n)\,] \sum [d_a - (n-1)/2]^2$$

$$\text{where } d_a = \sum P_a$$

P_a refers to the proportion of pairwise comparisons in which a group member is rated as more influential, and *n* indicates group size (number of members). Linearity scores can range from 0 (all influence relations are intransitive) to 1 (all influence relations are transitive).

The dyadic influence assessments also enabled us to calculate overall influence scores for individual participants.[2] As an additional manipulation check, we examined whether formal leaders in the leader-present condition had higher individual influence scores than

[2] A minimal individual influence score of 0 means that none of the group members rated the formal leader as most influential in any of the dyadic influence comparisons. A maximum score of 4, by contrast, means that all group members scored the formal leader as most influential in all of the dyads.

subordinates. As expected, leaders' individual influence scores were significantly higher (M = 2.92, SD =.92), compared with subordinates (M = 1.77, SD =.94, F [1,98] = 24.11; p = .00), supporting the effectiveness of our formal leader manipulation.

Results Study 1

We tested Hypothesis 1 using a one-way ANOVA, with informal hierarchy strength as the dependent variable. As expected, linearity of the informal influence hierarchy was lower in groups with a formal leader (M = .46, SD = .18) than in groups without formal leadership (M = .59; SD = .19; F [1, 38] = 5.24, p = .03, η^2 = .12). Hence, Hypothesis 1 was supported.

Discussion Study 1

In line with our first hypothesis, this experimental study demonstrated that groups developed stronger informal hierarchies when formal leadership was absent and weaker informal hierarchies when formal leadership was present. These results are consistent with previous experimental work showing that in leaderless groups, informal hierarchies emerge strongly (Bales et al., 1951; Fisek & Ofsche, 1970). Our findings add to this research by providing causal evidence for the formal leadership-informal hierarchy link, thus offering initial evidence for the proposed uncertainty-reducing function of informal hierarchies in groups.

At the same time, the experimental nature of the study may raise questions about the generalizability of its findings to more realistic settings in which groups may interact over longer time periods. Indeed, a complete absence of formal leadership (as in our no formal leadership condition) is relatively rare within most groups outside the laboratory (Devine, Clayton, Philips, Dunford, & Melner, 1999). Even self-managing or autonomous work teams typically have external leaders who act as coordinators or coaches with official authority (Carson et al., 2007; Manz & Sims, 1987). Also, consistent with previous work (e.g., Bottger & Yetton, 1988), we considered the present experimental task to be relatively complex. In

real-life work groups, however, assignments may be even more complex than the task used in this experiment because these groups are often responsible for multiple different subtasks that require intricate integration over a prolonged time period.

We also note that all formal leaders in the experiment were male; and groups across the two conditions had different sizes. These design choices were deliberate to rule out leader gender effects and to create a viable basis for the comparison of informal hierarchy across conditions, but they may raise questions about the effects of leader gender and group size on informal hierarchy strength. Finally, we assigned subordinate roles to peer members in the formal leadership condition, whereas we assigned team member roles to peer members in the no formal leadership condition. We did this to ensure that participants accepted their appointed leader as legitimate in the formal leadership condition, but this differential role assignment across conditions may also have affected our results. We conducted two additional studies to address these limitations and to test Hypotheses 2 and 3.

Study 2—Methods, Results, and Discussion

Study Contexts

We conducted Study 2 in the context of a four-week full-time management simulation that was part of the graduate management program of a large Dutch university. The simulation was developed by MCC Nederland BV and has provided the setting for previous academic research (e.g., Bunderson, Van der Vegt, & Sparrowe, 2014). During the simulation, business students assumed the role of the senior management team of a fictional medium-sized company. These teams' primary goal was to build and execute a workable strategic business plan. This required that teams made decisions about all aspects of corporate management, including production, staffing, marketing, finance, and R&D. Furthermore, the teams were responsible for managing and satisfying several important stakeholders (e.g., banks, the board of directors, and the workers' council). As such, the management simulation

represented a highly complex task in which close coordination between team members was pivotal.

Once students had been assigned to a team, they selected a general manager who functioned as formal leader. This selection was generally based on who was most willing to come forth and take responsibility; if multiple individuals volunteered for the formal leader role, then selection was typically based on votes. After choosing the formal leader, team members divided the other functional roles (e.g., HR officer, finance officer, marketing officer). Each team worked together on a daily eight to nine hour work schedule in a designated area within the university. The simulation comprised four rounds (one round per week), with formal performance evaluations after each round.

Sample and Procedures.

The sample comprised 160 students who were randomly assigned to 20 eight-person teams. Of the formal leaders, 60% were female, and their average age was 21.35 years (*SD* = .88). Of the other participants (i.e., subordinates), 52.5% were male, and their average age was 21.76 years (*SD* = 1.63). We presented our data collection as a study into leadership and team dynamics, and participation was voluntary. Also, we informed the students that they would be allocated a unique code for matching their data over different time points, and that after data collection, their responses would be anonymized. We distributed a pre-simulation questionnaire to collect information on demographics. Subsequently, we distributed four questionnaires at the end of every week, which contained our measures of formal leadership style and informal hierarchy strength.

Measures

Directive formal leadership. Group members rated their formal leader's directive leadership style using seven items from Lorinkova et al. (2013). Example items are, "The group leader takes charge of our group" and "The group leader defines tasks and

responsibilities of group members." Cronbach's alpha was .92 in week 1; .90 in week 2; .92 in week 3; and .94 in week 4. Aggregation statistics supported averaging individual members' responses to the group level (on average over the four time points, ICC1 = .19, all *p*s < .01; ICC2 = .61; mean $r_{wg(j)}$ = .90; Bliese, 2000; James, Demaree, & Wolf, 1984).

Informal hierarchy strength. As in Study 1, we captured informal hierarchy strength using a dyadic measurement approach in which each group member assessed all members' relative influence within each possible dyad in the group (excluding formal leaders). We subsequently used these ratings to calculate linearity scores (Singh et al., 2003), using the same formula as in Study 1.

Control variables. We considered a number of control variables. First, although we had no a-priori hypotheses about the effects of other formal leadership styles, we also measured empowering leadership (i.e., leadership focused on promoting participation in decision-making, information sharing, and teamwork) because prior research has often examined directive and empowering leadership in conjunction (e.g., Hmieleski & Ensley, 2007; Lorinkova et al., 2013). All group members rated their formal leaders' respective behavior, using seven items from Lorinkova et al. (2013). Cronbach's alpha was .85 in week 1; .89 in week 2; .93 in week 3; and .94 in week 4. Aggregation statistics supported aggregating individual members' responses to the group level (on average over the four time points, ICC1 = .11, all *p*s < .01; ICC2 = .47; mean $r_{wg(j)}$ = .92).

Second, we considered both leaders' gender and within-group gender diversity because these variables are potentially related to the development of informal influence relations within groups (Schmid Mast, 2002). Gender diversity was captured using Blau's diversity index (1977), which was calculated as $1 - \sum P_i^2$, where P is the proportion of individuals in a category (male/female) and i is the number of categories.

Results Study 2

Table 2.1 presents means, standard deviations, and intercorrelations for the variables across the different time points. The measures of formal directive leadership and informal hierarchy were moderately to highly stable over time (directive leadership, T1-T2: r = .69; T2-T3: r = .93; T3-T4: r = .89; all ps < .05; informal hierarchy strength, T1-T2: r = .60; T2-T3: r = .54; T3-T4: r = .83; all ps < .05). None of the control variables was significantly correlated with informal hierarchy strength across any of the time points, so we decided to omit the control variables from further analyses to avoid power problems and biased parameter estimates (Becker, 2005).

Hypothesis 2 predicted that directive formal leadership is negatively related with informal hierarchy strength. We used multilevel regression analysis with time as nesting variable to examine this notion, using grand-mean centered predictors (Hox, 2010). To examine the relationship between formal directive leadership and informal hierarchy strength over time, we regressed informal hierarchy strength at time points 2, 3 and 4 on directive leadership at time points 1, 2 and 3, respectively (i.e., a lagged design).

In the first step of the analyses, we estimated a null model with only an intercept term and variance across time points and across groups. Model 2 added directive leadership as a fixed, time-varying predictor of informal hierarchy strength (see Table 2.2). In support of Hypothesis 2, results demonstrated a significant negative relationship between directive leadership and informal hierarchy strength at the next time point (B = -.09; SE = .04; p = .02). We note that this relationship was still significant when (a) allowing the slope of directive leadership to vary and (b) including the control variables time, leader gender, group gender diversity, and empowering leadership. Furthermore, comparing the -2log likelihood values of the models, we conclude that Model 2 (including the predictor variable) is a significant improvement over Model 1 (the null model; χ^2 (1) = 4.456, p = .00).

Table 2.1

Means, Standard Deviations, and Bivariate Correlations (Study 2)

	Mean	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Empowering leadership T1	4.99	.46													
2. Empowering leadership T2	5.14	.38	.67*												
3. Empowering leadership T3	5.03	.56	.44*	.86*											
4. Empowering leadership T4	5.00	.52	.54*	.71	.71*										
5. Leader gender	.60	.50	-.18	-.24	-.24	-.23									
6. Gender diversity	.43	.09	.01	-.09	-.06	-.14	-.15								
7. Directive leadership T1	4.66	.70	.74*	.52*	.32	.41	.11	-.10							
8. Directive leadership T2	4.87	.52	.62*	.81*	.76*	.53*	-.21	-.06	.69*						
9. Directive leadership T3	4.91	.60	.52*	.86*	.89*	.62*	-.24	-.21	.56*	.93*					
10. Directive leadership T4	4.92	.60	.52*	.76*	.80*	.80*	-.32	-.20	.52*	.82*	.89*				
11. Informal hierarchy strength T1	.38	.16	.04*	.17	.04	.26	.00	.35	-.09	-.03	-.05	.14*			
12. Informal hierarchy strength T2	.30	.18	.26	.57*	.49*	.54*	-.20	-.16	-.02	.25	.41	.53*	.60*		
13. Informal hierarchy strength T3	.30	.16	-.11	.10	.07	.20	.17	.16	-.03	-.09	-.03	.13	.74*	.54*	
14. Informal hierarchy strength T4	.22	.18	-.07	-.06	-.07	.12	.11	.18	.03	-.14	-.15	.02	.61*	.21	.83*

Notes. $N = 20$. leader gender is coded 0 = male, 1 = female. $^{*}p < .05$.

We also tested whether the direction of the directive leadership-informal hierarchy relationship could be reversed. To do so, we regressed directive leadership at time points 2, 3, and 4 on informal hierarchy strength at time points 1, 2, and 3, respectively. First, we again estimated a null model. Then, Model 2 added informal hierarchy strength as a fixed, time-varying predictor of formal directive leadership. Results demonstrated that informal hierarchy strength did not significantly predict directive leadership at the next time point (B = .31, SE = .27, p = .27). Overall, this pattern of findings suggests that the relationship between directive leadership and informal hierarchy strength is non-reciprocal.

Table 2.2

Multilevel regression results (Study 2)

	DV: Informal hierarchy strength	
	Model 1	Model 2
	B (SE)	*B (SE)*
Intercept	.27 (.03)	.27 (.03)
Directive leadership		-.09 (.04)*
Variance		
Time points	.014 (.006)	.013 (.003)
Groups	.016 (.004)	.017 (.007)
-2Log likelihood	-53.160	-57.616
	DV: Directive leadership	
	Model 1	Model 2
	B (SE)	*B (SE)*
Intercept	4.90 (.12)	4.80 (.15)
Informal hierarchy strength		.31 (.27)
Variance		
Time points	.040 (.009)	.040 (.009)
Groups	.273 (.091)	.267 (.089)
-2Log likelihood	38.978	37.706

Notes. N = 60. Values are unstandardized regression coefficients. Standard errors are in parentheses. *$p < .05$.

Discussion Study 2

Study 2's results supported Hypothesis 2, indicating that formal directive leadership at one time point negatively related with informal hierarchy strength at a later time point (i.e., one week later), but not the other way around. Adding to the findings from Study 1, these results indicate that beyond the mere presence of a formal leader, the formal leader's directive behavior significantly shapes the strength of the informal influence hierarchy within the group. Consistent with the proposed uncertainty-reducing function of informal hierarchies, a group's informal hierarchy was less pronounced in groups in which the formal leader provided clear structure and direction to the groups' members.

A notable strength of Study 2 is that it examined the relationship between formal directive leadership and informal hierarchy strength in a relatively controlled setting in which participants worked together on a complex task for a longer time period. Moreover, the results showed that neither leaders' gender nor groups' gender diversity significantly related with informal hierarchy strength, and controlling for these aspects did not meaningfully alter our findings and conclusions. We note, however, that group size was fixed in Study 2, and we employed student participants to test our hypothesis. Moreover, because task complexity did not vary, we were unable to test Hypothesis 3. Study 3 was designed to address these issues and to examine the generalizability of our findings to real-life work settings.

Study 3—Method, Results, and Discussion

Sample and Procedures

We drew on a heterogeneous sample of organizational work groups to test our full moderation model (i.e., Hypothesis 3). Specifically, our data collection focused on intact work groups that (a) consisted of at least four members, (b) worked toward common goals, and (c) had frequent face-to-face interaction (Kozlowski & Bell, 2003). We first contacted groups' formal leaders who, after agreeing to participate, provided additional information

about group tasks, group size, and members' names. We then administered a survey in which all group members rated their formal leaders' directive behavior, group task complexity, and each other's informal influence. Participation was voluntary, and we assured all participants of the confidentiality of their responses.

Fifty-five groups whose leaders agreed to participate in the study matched the selection criteria. After receiving the questionnaires, however, members from three groups indicated that the survey was not applicable to their working situation, and two groups' response rates were insufficient to calculate informal hierarchy scores (i.e., below 50%; Bunderson, 2003). The final sample therefore consisted of 50 work groups comprising 230 members, distributed across 42 organizations from a variety of industries (e.g., services—28%; manufacturing—20%; logistics and trade—20%; finance and insurance—14%; education—10%; health care—8%). The individual response rate among the participating work groups was 93%. Of the participants, 58% were male, their average age was 39.82 years (*SD* = 12.53), and average organizational tenure was 4.60 years (*SD* = 5.20).

Measures

Unless otherwise indicated, the items were rated on a seven-point scale (1 = strongly disagree, 7 = strongly agree).

Directive formal leadership. Group members rated their formal leader's directive leadership style using seven items from Lorinkova et al. (2013). Example items are, "The group leader takes charge of our group" and "The group leader defines tasks and responsibilities of group members." Cronbach's alpha was .88, and aggregation statistics supported aggregating individual members' responses to the group level (ICC1 = .38, $p < .01$; ICC2 = .73; mean $r_{wg(j)}$ = .86; Bliese, 2000; James et al., 1984).

Task complexity. We measured task complexity with eight items adapted from Withey et al. (1983). Example items include, "We follow an understandable sequence of steps

in performing our group tasks" and "Group members do about the same job in the same way most of the time" (both items reverse-scored). Cronbach's alpha was .77, and aggregation statistics supported aggregating individual responses to the group level (ICC1 = .39, $p < .01$; ICC2 = .75; mean $r_{wg(j)} = .92$).

Informal hierarchy strength. As in the previous studies, we captured informal hierarchy strength using a dyadic measurement approach in which each group member assessed all members' relative influence within each possible dyad in the group (excluding formal leaders). We subsequently used these ratings to calculate informal hierarchy linearity scores (Singh et al., 2003), using the same formula as in Studies 1 and 2.

Control variables. Given that we gathered data from a diverse sample of teams, we checked whether teams from different industries and from differently sized organizations varied in informal hierarchy strength. One-way analyses of variance did not yield significant effects of either industry type (F [5,44] = 1.40, $p = .24$) or organization size (F [3,46] = .29, $p = .83$) on informal hierarchy strength. Also, incorporating these variables as categorical controls in our analyses did not change the results and conclusions. Furthermore, because groups varied considerably in size and average member tenure (in years), and because past research has demonstrated that these variables relate to group processes and communication (Ancona & Caldwell, 1992; Stewart & Barrick, 2000), we considered these variables as covariates. As in the previous study, we also incorporated leader gender and group gender diversity as potential controls.

Results of Study 3

Table 2.3 presents means, standard deviations and intercorrelations for all Study 3 variables. We note that none of the control variables (group size, average team tenure, leader gender, group gender diversity) significantly related to informal hierarchy strength. We therefore report the results of the analyses without these controls to avoid power problems and

biased parameter estimates (Becker, 2005). We note that the pattern of results and conclusions remained highly similar when incorporating the control variables.

Table 2.4 summarizes the results of a moderated hierarchical regression analysis with standardized predictors. As shown, these findings do not support Hypothesis 2, because formal directive leadership and informal hierarchy strength were not significantly related. Importantly, however, we note that this does not contradict our earlier results because we expected the relationship between formal leadership and informal hierarchy strength to be especially strong under conditions of relatively high task complexity (as in Studies 1 and 2) and to be reduced under conditions of lower task complexity. Consistent with this expectation, we found a significant interaction of directive formal leadership and task complexity with informal hierarchical strength (B = -.08, SE = .04; p = .04, see Table 2.4). Figure 2.1 depicts this moderation. Simple slopes analyses revealed that the relationship between directive formal leadership and informal hierarchy strength was non-significant when task complexity was relatively low (-1 SD; B = .05, SE = .04, p = .24). The relationship was negative, by contrast, under conditions of higher task complexity, although it only reached marginal significance at +1 SD of task complexity (B = -.11, SE = .06, p = .06). Further examination of the moderation effect using a regions-of-significance approach (i.e., the Johnson-Neyman technique; Preacher, Curran, & Bauer, 2006) revealed that the negative link between directive leadership and informal hierarchy strength was significant at any value of task complexity greater than 1.41 SD above the mean. Collectively, these results support Hypothesis 3.[3]

[3] Similar to Study 2, we also measured formal empowering leadership (using a seven-item scale by Lorinkova et al., 2013). Results revealed no significant main effect of empowering leadership, and inclusion of empowering leadership as a control variable in our test of Hypothesis 2 yielded a largely equivalent pattern of results. Additionally, we explored the possible moderating roles of empowering leadership as well as leader gender, group gender diversity, and team size. These additional analyses demonstrated that none of these variables interacted significantly with directive leadership to predict informal hierarchy strength.

Table 2.3
Means, Standard Deviations, and Bivariate Correlations (Study 3)

			Correlations						
	M	*SD*	1	2	3	4	5	6	7
1. Leader gender	.26	.44	-						
2. Gender diversity	.25	.21	.09	-					
3. Group size	4.92	2.19	.38*	.25	-				
4. Group average tenure	4.58	3.78	.06	-.27	-.04	-			
5. Directive leadership	4.82	.84	.05	.06	-.14	.26	-		
6. Task complexity	4.16	.68	.04	.13	.12	-.34*	.27	-	
7. Informal hierarchy strength	.51	.23	.13	.05	.08	-.12	-.07	.25	-

Notes. $N = 50$. leader gender is coded 0 = male, 1 = female. $^{*}p < .05$

Table 2.4

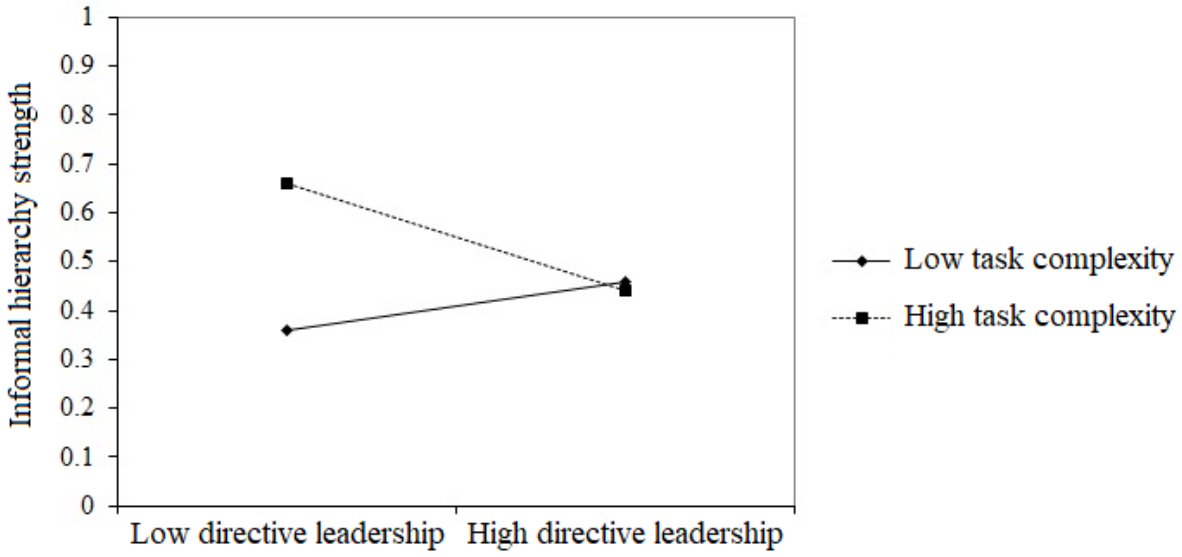
Hierarchical Moderated Regression Results (Study 3)

	Informal hierarchy strength
Main Effects	
Directive leadership	-.03 (.03)
Task complexity	.07 (.03)*
Interactions	
Directive leadership × task complexity	-.08 (.04)*
ΔR^2 (from adding the interaction coefficient)	.09
R^2	.15

Notes. N = 50. Values are unstandardized regression coefficients. Standard errors are in parentheses. *$p < .05$.

Figure 2.1

Two-Way Interaction of Directive Leadership and Task Complexity on Informal Hierarchy Strength



Discussion of Study 3

In support of Hypothesis 3, this study demonstrated a negative relationship between directive formal leadership and informal hierarchy strength in teams performing relatively complex tasks, but not in teams performing less complex tasks. As predicted, task complexity appears to be a critical boundary condition for the formal leadership-informal hierarchy linkage, such that groups primarily develop strong informal hierarchies in complex task contexts that require clear-cut intricate coordination *and* when their formal leader's non-directive behavior fails to provide structure and guidelines.

These results were obtained from real-life work groups across various organizations and industries, increasing the generalizability of our findings. We note, however, that the negative relationship between formal leadership and informal hierarchy strength reached conventional levels of statistical significance at 1.41 standard deviations above the mean value of the moderator. One possible explanation is that the variance in our measures of task complexity was somewhat limited. However, we consider this not to be very likely because the standard deviation for our task complexity measure was similar to earlier research (e.g., Bunderson et al., 2016). A second, and more likely, explanation for this finding is that the diversity of organizations in our sample was relatively high. This may have resulted in some noise in the data, making it more difficult to detect significant main and interaction effects. Additional research examining the interactive relationship of directive leadership and task complexity with informal hierarchy strength in a more homogenous sample of real-life work groups would be useful to address this issue.

One notable limitation of Study 3 is that it employed a cross-sectional and correlational design, such that it is impossible to draw causal conclusions. At the same time, the proposed relationships are based on strong theory, and the results of Studies 1 and 2 suggest that, at least in more complex task environments, the direction of causality is from

formal leadership to informal hierarchy strength, rather than vice versa. Nevertheless, future research using longitudinal designs might be fruitful to further examine possible reciprocal effects and provide further causality evidence. Moreover, it should be noted that we used a self-report measure of group task complexity in Study 3. This is consistent with our reasoning that group members will look for structure when they experience uncertainty, and the relatively high ICC and r_{wg} values indicate that individuals' task complexity perceptions were shared within groups to a large extent. Nevertheless, future research might examine the relationships between directive leadership behavior and informal hierarchy strength in groups that can be objectively categorized as performing more or less complex work.

General Discussion

The aim of this study was to identify critical antecedents of groups' informal hierarchy strength. Findings from three independent studies provided support for our general proposition that groups may develop stronger informal hierarchies in situations that are relatively ill-defined, unpredictable, and unstructured. More specifically, our studies showed that formal leadership was causally and non-reciprocally related with informal hierarchy strength under conditions of moderate (Study 1) and high task complexity (Study 2) and illustrated group task complexity as a key moderating factor in the formal leadership-informal hierarchy linkage (Study 3).

Theoretical Implications

These findings make several important contributions to the hierarchy literature. First, the present studies advance new knowledge on the origins of informal hierarchies within groups. Whereas existing research has generally focused on the consequences of informal hierarchical differentiation (e.g., He & Huang, 2011; Ronay et al., 2012), our studies uncovered the presence versus absence of formal leadership and the formal leader's directive style as critical antecedent variables and demonstrated the moderating role of task complexity,

thus expanding the nomological network around informal hierarchy. As such, this investigation is among the first to unveil key group-level predictors that may explicate important differences in distinct groups' informal hierarchy patterns. Specifically, our findings suggest that strong informal hierarchies are most likely to surface in response to ambiguous, ill-defined contexts that originate from complex group tasks and a lack of formal directive leadership.

Second, our studies address calls for a more comprehensive perspective on hierarchical differentiation in groups (Diefenbach & Sillince, 2011; McEvily et al., 2014). Scholars have argued, in particular, that both formal and informal hierarchies can critically shape members' coordination, cooperation, and task accomplishment. As such, studies focusing on only one of these hierarchy aspects may create an inherently incomplete account of how groups organize themselves. By examining the role of formal leadership—a key element of a group's formal hierarchy (De Hoogh et al., 2015)—for informal hierarchy strength, this investigation takes steps to integrate the heretofore disparate literatures on formal and informal hierarchy. We demonstrate that formal and informal aspects of hierarchy are closely connected, with informal hierarchical differences primarily emerging in response to a lack of clear-cut, formal hierarchical differentiation.

Finally, by illustrating that a lack of formal leadership only promotes informal hierarchy strength in complex task settings, our results show that the link between formal and informal hierarchies may be more intricate and context-specific than previously believed (cf. Diefenbach & Sillince, 2011). Our findings provide nuance, in particular, to the notion that some form of hierarchy—be it formal or informal—is inevitable within most (if not all) groups (Leavitt, 2004; Magee & Galinsky, 2008), demonstrating that group members may perceive formal and informal hierarchies as means toward the same end, namely the reduction

of uncertainty in complex situations. Without such complexity, either form of hierarchy may be dispensable.

Practical Implications

Work design in many organizations has changed dramatically over the past decades (Diefenbach & Sillince, 2011). A key development, in this regard, is the increasing use of self-managing teams or (semi-)autonomous work groups (Lawler, Mohrman, & Benson, 2001). Such groups are typically responsible for relatively complex tasks, and formal leaders often remain at a distance, acting only as remote coaches or facilitators without directly intervening in a group's daily task accomplishment (Carson et al., 2007; Manz & Sims, 1987). Also, this type of group is usually installed with the explicit or implicit goal of fostering equality among members (Cohen & Ledford, 1994). Paradoxically, however, our findings suggest that by reducing the strength of the formal hierarchy in groups that work on complex tasks, organizations may unintentionally replace one type of hierarchical differentiation (i.e., formal) with another type (i.e., informal). In doing so, they may retain important constraints on individual group members' participation—this time originating not from the formal leader, but from other group members informally in charge (Barker, 1993; Langfred, 2007). Consequently, organizations motivated to increase egalitarianism and participation among peers within complex task groups may need to maintain adequate forms of formal leadership, possibly combining sufficiently directive formal leadership behavior with initiatives that encourage individual members to voice their ideas, views, and opinions (Srivastava, Bartol, & Locke, 2006).

Limitations and Directions for Future Research

By combining three independent studies, this investigation was able test its hypotheses across three markedly different research designs and samples, increasing confidence in our

findings' internal and external validity. At the same time, a number of limitations should be considered when interpreting these results.

First, we acknowledge that our studies did not directly measure the proposed uncertainty-reducing mechanisms that may explain the relationship between formal leadership and informal hierarchical differentiation. Importantly, however, research has emphasized that people are often not consciously aware of their preference for structure, certainty, and predictability (Neuberg & Newsom, 1993). Tiedens and colleagues have shown, accordingly, that hierarchical differentiation often reflects an unconscious mechanism that individuals use to structure their situation and smoothen interactions (Tiedens & Fragale, 2003; Tiedens et al., 2007). In the present research, the moderating role of task complexity demonstrates that groups are most likely to create strong informal hierarchies in situations characterized by a severe lack of structure and predictability (i.e., resulting from a combination of weak formal leadership and complex group tasks). As such, the overall design of our studies represents a moderation-of-process approach that can underscore the plausibility of unmeasured mediating mechanisms (Spencer, Zanna, & Fong, 2005), thus indirectly supporting our theoretical rationale.

Nevertheless, future research might further increase confidence in our conceptual considerations by examining the role of other uncertainty-related variables. One possible candidate is group members' individual need for structure and certainty (Thompson, Naccarato, Parker, & Moskowitz, 2001). Individuals characterized by this trait are more readily threatened by ambiguous and unclear situations (e.g., the absence of strong formal leadership) compared to individuals low in need for structure (Thompson et al., 2001). To further bolster our conceptual reasoning, future work might therefore investigate whether the negative link between formal and informal hierarchy holds more strongly for groups

composed of individuals higher (rather than lower) in need for structure and related characteristics.

Second, our operationalization of formal leadership differed across the studies. Whereas Study 1 manipulated the presence versus absence of a formal leader, Studies 2 and 3 employed a survey measure of directive leadership behavior. As a result, one may wonder to what extent the formally appointed leaders in Study 1 exhibited directive leadership styles. Although our personal observations during the experiment confirmed that the individuals assigned to a formal leadership role did act in a directive way, future experimental research might explicitly measure (or manipulate) participants' directive leadership behavior.

Third, we note that all of our studies manipulated or measured legitimate formal leadership. In Study 1, we legitimized formal leadership with a leadership questionnaire, in Study 2, group members chose their own formal leader, and in Study 3, formal leaders were endowed with official organizational authority. It would thus be an interesting future research direction to examine formal leaders' legitimacy as a possible boundary condition, because directive formal leaders may only (or primarily) reduce informal hierarchy strength when subordinates accept their authority (Yukl, 2013). The legitimacy of formal leaders may be low, for example, when they are seen as incompetent, reducing their ability to exert authority over group members (Magee & Galinsky, 2008). Informal hierarchy may therefore emerge more strongly in groups with leaders who are seen as illegitimate, even when these leaders adopt a directive style.

Finally, future research might examine to what extent our findings can be extrapolated to the individual level. Previous research has investigated the personality correlates of individuals' informal leader emergence (Judge, Bono, Ilies, & Gerhardt, 2002), demonstrating, for example, that highly dominant individuals are more likely to take on leadership positions compared to less dominant individuals. One explanation for this finding

is that dominant individuals are generally perceived as highly competent and are therefore granted influence by other group members (Anderson & Kilduff, 2009). Yet based on our findings, an interesting alternative explanation is that dominant individuals are granted influence because they are the ones most likely to fulfill group members' need for structure and certainty. Such effects are especially likely to occur in ill-defined, ambiguous, and uncertain task situations characterized by a lack of strong formal leadership and high task complexity. Future research might investigate these dynamics of influence attainment at the individual level, while incorporating group-level contextual factors that determine the structure and predictability of the group situation.

Conclusion

Taken together, the findings from our studies broaden our understanding of the link between formal leadership and informal hierarchy, illustrating that informal hierarchical differences are most pronounced within groups when formal leadership is absent or non-directive and when, at the same time, groups face highly complex tasks. These findings demonstrate that formal and informal hierarchy are closely linked, but only in situations of high task complexity that require the structuring function of one or the other.

CHAPTER 3

Informal Hierarchy and Team Performance: The Moderating Role of Performance Alignment and Dominance Alignment

Abstract

Informal hierarchies are a ubiquitous feature of teams. Yet, research on the informal hierarchy-team performance linkage has yielded mixed results. The current study addresses this issue, by identifying core underlying assumptions in the literature. That is, the two primary perspectives on the topic (i.e., the functionalist and conflict account) differentially assume that influence within informal hierarchies is either based on individual members' respective performance or dominance levels. In a study among 129 teams from a diverse range of organizations, we demonstrate that strong informal hierarchies positively relate to team performance when performance alignment is high (i.e., the most influential team members are also the highest performers) – a critical assumption underlying the functionalist account. Additionally, results demonstrate that informal hierarchies aligned with member dominance negatively relate to team performance, irrespective of hierarchy strength. These findings contribute to the ongoing debate about the potential positive and negative sides of informal hierarchy, by demonstrating how different characteristics of informal hierarchy differentially relate to team performance.

CHAPTER 3: INFORMAL HIERARCHY AND TEAM PERFORMANCE

Informal influence hierarchies are a ubiquitous feature of groups and teams (Leavitt, 2004; Magee & Galinsky, 2008). Even teams without any formal hierarchical differences develop informal hierarchies, in which higher-ranking members have more influence than lower-ranking members (Bales et al., 1951). The strength of informal hierarchies may vary over teams, however, with some teams exhibiting relatively weak hierarchies in which most team members can influence each other; and others exhibiting relatively strong hierarchies, in which influence clearly flows from top to bottom throughout the hierarchy (Bunderson et al., 2016; Schmid Mast, 2002.

Given hierarchy's omnipresence, scholars have focused on identifying the consequences of informal hierarchy strength for team performance. On the one hand, functional theorists argue that, by clearly denoting who leads and who follows, strong informal hierarchies reduce uncertainty about group members' roles (Anderson & Brown, 2010; Halevy et al., 2011). As a result, strong informal hierarchies can increase coordination, reduce conflict, and hereby enhance team performance in comparison to weaker hierarchies (e.g., Halevy et al., 2012; Ronay et al., 2012). In contrast, proponents of the conflict account posit that strong informal hierarchies instill feelings of inequality and rivalry among team members and can therefore lead to contests about members' relative hierarchical positions (Greer et al., 2018). In doing so, strong informal hierarchies may harm team member relations and distract members from their tasks, thereby reducing team performance (Bendersky & Hays, 2012; Greer & Dannals, 2017).

The above overview signifies the literature's current focus on investigating the effects of *strength* as the most important, or at least most consequential, characteristic of an informal hierarchy. Yet, findings regarding the relationship between hierarchy strength and team performance have been equivocal. Importantly, hierarchies are not characterized by their strength alone, and the inclusion of other hierarchy characteristics could shed important light

on these mixed findings. Specifically, next to their strength, hierarchies are also characterized by their origins. Indeed, team members may acquire higher ranks in the hierarchy for many different reasons, and these underlying reasons for influence differentiation may have profound implications for how people feel and behave within their hierarchies. In this paper, we therefore combine informal hierarchy's strength with information on hierarchy's origins, to draw conclusions about the performance effects of different types of informal hierarchies.

Broadly speaking, the literature has identified two primary drivers of team members' rank in the informal hierarchy: merit and dominance (Henrich & Gil-White, 2001; Magee & Galinsky, 2008; Ridgeway, 1987). Team members who demonstrate merit for the team (e.g., because they perform well), or display dominance (e.g., show assertive behavior) tend to become more influential and rank higher in the informal hierarchy. As a result, individual team members' influence becomes aligned with individual merit, dominance, or both, resulting in informal hierarchies that are more or less merit- or dominance-based.[4]

Drawing from this literature, we propose that the consequences of informal hierarchy strength depend largely on the extent to which hierarchies are aligned with either performance or dominance. Specifically, when informal hierarchy originates from team members' performance levels (i.e., merit), the overall hierarchy will generally be perceived as legitimate and fair by all team members (Henrich & Gil-White, 2001; Magee & Galinsky, 2008). Consequently, a strong informal hierarchy, with a clear downward chain of command should then be more beneficial for team performance than a weak informal hierarchy, because it enables teams to capitalize on the high performance of its best members while also benefiting from its coordination advantages (as argued by functionalist scholars). When, in contrast, the

[4] Importantly, expectation states theory argues that influence also gets distributed among team members based on their status characteristics (such as gender, age and tenure; Berger et al., 1980). Although these are indeed pivotal drivers of influence distribution in hierarchies, we argue that these bases are more distal than performance and dominance and are not necessarily consequential for hierarchies' performance in combination with informal hierarchy strength. We explain and analyze this more elaborately in the supplementary analyses section.

hierarchy originates from team members' dominance, a strong informal hierarchy should be less beneficial for team performance than a weak informal hierarchy. This is because dominance-based hierarchies will be perceived as rather unfair and illegitimate. Hence, a strong informal hierarchy may then bring out the negative sides identified by the conflict accounts of hierarchy, such as competition and conflict between a team's members.

We test these propositions in a field study among 129 teams from different industries. In doing so, this study strives to shed light on the contradicting perspectives regarding informal hierarchy's relation to performance (Bunderson et al., 2016; Greer et al., 2018). By investigating informal hierarchy's strength in combination with merit and dominance alignment, this study is one of the first to jointly examine different hierarchy characteristics in relation to performance outcomes. We believe that this is an important step, because functionalist views often assume that hierarchies are built on merit (Anderson & Brown, 2010), while conflict accounts focus more on team member dominance. Second, research so far has highlighted merit and dominance as two viable routes for people to gain influence within teams (Henrich & Gil-White, 2001). This previous work has thus adopted an individual level perspective on merit, dominance and influence. Our study extends this research area by investigating the role of merit and dominance at the group-level of analysis.

Theory and Hypotheses

Informal Hierarchy Strength and its Performance Consequences

Informal hierarchy reflects the overall pattern of all dyadic influence relations between members of a given team (Bunderson et al., 2016; Everett & Krackhardt, 2012), with influence being an individual's ability to change another team members' actions in some intended fashion (Thibaut & Kelley, 1959). Following this conceptualization, a strong informal hierarchy exists when the influence relations between team members have a clear-cut linear structure, such that when team member A has influence over B, and B has influence

over C, then member A also has influence over member C (Chase, 1980; Krackhardt, 1994). Hence, influence flows from top to bottom throughout the hierarchy. When, however, member C in this example is able to exert influence over the otherwise most influential member A, then a cyclical influence relation exists that reduces the strength of the informal hierarchy. In the example situation, all team members are able to influence each other, either directly or indirectly, resulting in a flat, egalitarian informal hierarchy (Bunderson et al., 2016; Chase, 1980).

The functionalist perspective on the effects of informal hierarchy suggests that the clear downward flow of influence that characterizes strong informal hierarchies serves to meet team members' fundamental need for structure (Friesen et al., 2014; Gruenfeld & Tiedens, 2010). By clearly delineating who leads and who follows, strong informal hierarchy helps team members to coordinate work, avoid conflict, and perform well (Anderson & Brown, 2010; Halevy et al., 2011). In line with this perspective, empirical research indeed demonstrates that informal hierarchy has positive performance effects. Specifically, informal hierarchy strength has been related to firm financial performance (He & Huang, 2011), improved cooperation and coordination (Halevy et al., 2012), and reduced process conflict in teams that work on highly complex tasks (Bunderson et al., 2016).

On the other hand, the conflict perspective emphasizes that teams with strong informal hierarchies may perform worse compared to more egalitarian teams. According to this perspective, team members are generally motivated to climb the ranks, which will lead to struggles over members' relative positions (Greer et al., 2017; Hays & Bendersky, 2015). In turn, the increased conflict distracts people from their main tasks and ultimately decreases overall team performance (Bendersky & Hays, 2012; Greer & Van Kleef, 2010). Even when the hierarchical ordering is not conflict-inducing, informal hierarchies still have consequences for the behaviors of individual team members at different positions. That is, lower ranked

team members may be reluctant to share ideas and refrain from voicing their views in the presence of highly influential authority figures (Mullen, Johnson, & Salas, 1991; Nembhard & Edmondson, 2006). As a result, strong informal hierarchies potentially inhibit open communication and information sharing within teams, and as such negatively impact overall performance (Edmondson, 2003; Tost, Gino, & Larrick, 2013).

The Process of Informal Hierarchy Emergence

To understand how and why different types of informal hierarchies emerge, we first unpack the process through which dyadic influence differences, as the building blocks of informal hierarchies, evolve. Dyadic influence differences emerge through a process of influence claiming and influence granting (DeRue & Ashford, 2010; Joshi & Knight, 2014). Influence claiming occurs when one team member attempts to alter the behavior or opinions of another member. Influence granting occurs when a team member yields to the influence attempt of, or shows voluntary deference to, another team member. The emergence of dyadic influence differences requires that both influence claiming and influence granting processes take place (DeRue & Ashford, 2010).

Interestingly, theoretical work on merit-based and dominance-based hierarchies suggests important differences in the primacy of influence claiming and granting in the process of shaping the overall informal hierarchy (Cheng et al., 2013; Henrich & Gil-White, 2001). Specifically, in merit-based informal hierarchies influence granting mostly precedes influence claiming in the process of shaping the hierarchy. As Cheng and colleagues (2013, p. 105) note, in the case of merit-based hierarchies, influence "is *granted* to individuals who are recognized and respected for their skills, success, or knowledge" (emphasis added). In other words, low performing team members willingly demonstrate deference to high performers, as such exchanging their own potential influence for increased task contributions from the higher performing members. In response, this high-performing team member claims, or more

accurately, accepts the influence given by the deferent member. As such, merit-based hierarchies are built upon the voluntary deference by lower-ranked team members (Maner & Case, 2016).

Within dominance-based hierarchies, however, influence claiming mostly precedes influence granting (Cheng et al., 2013). That is, relatively dominant team members claim influence by attempting to alter other members' behavior in rather assertive ways, who then yield to this influence attempt by showing the desired behavior (Maner & Case, 2016). This dominance is not necessarily highly overt and coercive. Studies demonstrate that even the most subtle act of dominance by one individual (e.g., postural expansion or raising one's voice), leads to automatic deference by interaction partners (Lee & Ofsche, 1981; Tiedens & Fragale, 2003). As a result, such dominant-submissive interactions stabilize into unequal influence relationships that team members have not consciously chosen or agreed upon.

Due to the different processes underlying hierarchy emergence and the differential focus on influence claiming and granting, the two routes lead to hierarchies with distinct underlying psychologies. We therefore expect that informal hierarchy strength and information about its origins jointly determine its effect on team performance.

Merit Based Informal Hierarchies

We expect the positive effects of strong informal hierarchy to prevail when individual team members' influence is aligned with their performance (i.e., when the informal hierarchy is merit-based). In such hierarchies higher-ranked members exercise greater control over task activities, and therefore have disproportionate impact on team's task accomplishment (Anderson & Brown, 2010; Mazur, 1973). By putting their highest performing members in charge, teams follow the advice and decisions of the members who perform best (Bunderson, 2003). This should increase team performance especially when the differences between the higher- and lower-ranked members in terms of influence are larger (i.e., in a strong informal

hierarchy), compared to when they are smaller (i.e., in a weak informal hierarchy). In addition, the functionalist perspective posits that informal hierarchy strength positively relates to group functioning because it clarifies members' roles and positions (Anderson & Brown, 2010; Halevy et al., 2011). That is, all team members get assigned a role – either higher, average or lower rank – with associated rank-appropriate behaviors (Bales, 1950; Berger et al., 1980; Keltner, Gruenfeld, & Anderson, 2003). The role-clarifying function of a strong informal hierarchy can only work, however, when team members of all ranks indeed perform their rank-appropriate behavior. This means that highly-ranked individuals should be allowed to control interactions and give out instructions to others, and the lower-ranked should be motivated to comply (Magee & Galinsky, 2008). We argue that a system of motivated deference, as described above, is most likely to occur in teams where individual performance and influence are aligned (i.e., high performance alignment). In that situation, highly ranked members have earned the right to their position and associated directive behavior through their task performance (Henrich & Gil-White, 2001). As a result, the high ranked members will be allowed to control lower-ranked team members, who will in turn be motivated to follow their directives carefully.

When informal hierarchy strength in teams with high performance alignment is lower, however, this means that high-, average, and low-performers can all exert influence over team decisions relatively equally (Bunderson et al., 2016; Tarakci et al., 2016). In that situation, the undue influence of lower or averagely performing team members may lead to team decisions that are potentially non-optimal. In addition, due to the lower hierarchical strength, the coordination-benefits associated with strong informal hierarchy are reduced (Halevy et al., 2012). Taken together, we argue that the favorable processes promoted by a strong informal hierarchy combined with high performance alignment do not emerge when informal hierarchy is weaker, as such negatively impacting overall team performance.

Under low performance alignment, the opposite situation occurs, meaning that the lower performing team members are the ones in charge. We expect this situation to be detrimental for team performance, irrespective of whether informal hierarchy is weak or strong. First, the lowest performers are now able to exert the most influence on team decisions and the high performers follow. We expect that this role distribution will lead to sub-optimal team performance. Even a strong informal hierarchy should not bring forth its general advantages such as improved coordination, because the people in charge of coordinating the activities are not the ones who are best at it. Taken together, we anticipate that the potential positive relationship between informal hierarchy strength and team performance, will hold only when performance alignment is high, but not when performance alignment is low.

Hypothesis 1: The relationship between informal hierarchy strength and team performance is moderated by performance alignment, such that the relationship is positive when performance alignment is high.

Dominance Based Informal Hierarchies

Conflict accounts of informal hierarchy posit that informal hierarchies are often evaluated negatively, and may cause intragroup conflict and reduce information sharing, ultimately leading to lowered team performance (Greer et al., 2018). For a number of reasons, we suspect that these negative effects will most likely emerge when informal hierarchies are dominance based. First, due to the inherent inequity present in informal hierarchies, people often evaluate stronger hierarchies as more unfair and illegitimate compared to weaker informal hierarchies (Magee & Galinsky, 2008; Ridgeway & Diekema, 1989). We argue that this is especially true for hierarchies with high dominance alignment, in which higher ranked members are dispositionally assertive, and lower ranked members are dispositionally submissive. This role distribution of highly assertive informal leaders and submissive informal followers will increase the perceived salience of the hierarchical differences and

associated inequalities, which in turn negatively affects team members' appreciation of the hierarchy. For example, research demonstrates that when people are confronted with highly dominant authority figures, they experience negative feelings such as unfairness and psychological unsafety regarding the hierarchical ordering (Edmondson, 2003; Tost et al., 2013). In addition, when individuals perceive a hierarchy to be illegitimate, they become motivated to take action to restore the illegitimacy (Lammers, Galinsky, Gordijn, & Otten, 2008). As such, lower-ranked team members may engage in either unmotivated compliance with the higher-ranked members' directives, or in competitive behavior that challenge the current rank order, thereby enhancing status conflict and decreasing performance (Bendersky & Hays, 2012).

Second, high dominance alignment may strengthen approach and inhibition tendencies traditionally associated with high and low rank (Keltner et al., 2003). That is, people with a high ranking position are more likely to speak their minds due to their influential position, and people with a lower ranked position will keep their opinions to themselves more often. As such, we argue that the influential role of the higher ranked members, combined with their assertive style of communication, may exacerbate lower ranked members' tendency to behave in inhibited ways (Islam & Zyphur, 2005). Indeed, research demonstrates that, especially when influential authority figures behave in highly dominant and assertive ways (e.g., by interrupting others, spend much time talking), lower ranked members experience difficulty in sharing their opinions and ideas (Sauer, 2011; Tost et al., 2013). As such, the combination of high rank with high dominance, and low rank with low dominance may result in an informal hierarchy with highly overbearing team leaders, and overly submissive followers. This role distribution a is likely to inhibit information sharing and open communication, and therefore negatively impacts team performance. Taken together, we suspect a negative relationship between informal hierarchy strength and team performance under high dominance alignment.

Under lower dominance alignment, however, the hierarchical positions are distributed the other way around such that relatively submissive individuals hold high rank and more dominant individuals hold lower rank. Such a distribution is likely to make the hierarchical differences less salient compared to when dominance and rank were highly aligned. In this situation, lower ranked members who normally feel reluctant to share their opinions and ideas because of their position, may now be able to speak their mind due to their high level of trait dominance. In addition, higher ranked members who normally risk becoming overbearing because of their position, will still be able to be open to the opinions of others because of their trait submissiveness. As such, we expect the conflict-inducing effects that were present in strong informal hierarchies based on dominance to disappear. Taken together, we anticipate that the potential negative relationship between informal hierarchy strength and team performance, will hold only when dominance alignment is high, but not when dominance alignment is low.

Hypothesis 2: The relationship between informal hierarchy strength and team performance is moderated by dominance alignment, such that the relationship is negative when dominance alignment is high.

Method

Sample and Procedure

We collected data from a diverse sample of teams (from companies in the Netherlands, Germany and Greece). In order to identify teams, we relied on a standard data collection protocol, and only approached teams based on the criteria that they (a) consisted of four or more members, (b) internally coordinated efforts for joint goal accomplishment, (c) contained members that interact frequently face-to-face, and (d) consisted of members with interdependent tasks (Kozlowski & Bell, 2003). We contacted teams' formal leaders and invited them to participate in a study about work team functioning. When formal leaders

agreed to participate, they provided additional information, such as the names of all team members (required for the measurement of informal hierarchy strength; see below).

Of the 242 work teams that had initially agreed to participate in the study, eleven teams opted out of participation because of various reasons (e.g., time pressure at work, changes of team composition). Of the remaining 231 teams, 181 of the leaders and 807 of the team members responded, leading to an overall response rate of 67.9%. After matching the leader and team member data, 102 teams had to be deleted because of missing team leader or team member responses. The final sample therefore consisted of 129 teams, comprising 520 team members and 129 leaders. Of the team members, 50.8% were female. Their average age was 37.47 years (*SD* = 12.50), and average team tenure was 4.52 years (*SD* = 5.87). 66.6% percent had a vocational degree or higher. Of the team leaders, 33.3% were female. Their average age was 41.25 years (*SD* = 11.55), and average team tenure was 6.41 (*SD* = 7.31). 82% had a vocational degree or higher.

The teams came from organizations operating in different industries, such as business services & finance (19%), retail (19%), construction (16%), education (11%), health care (10%), IT (9%), government (9%), logistics (5%) and agriculture (2%). 38 of the teams worked in small organizations with fewer than 20 employees, 29 teams in organizations with 21 to 100 employees, 29 teams in organizations with 101 to 500 employees, and 30 teams in organizations with more than 500 employees (for three organizations, this data was missing).

Measures

Informal hierarchy. We measured the overall strength of a team's informal influence hierarchy (cf. Chase, 1980), using *linearity* as a prominent indicator of informal influence differences within teams (Schmid Mast, 2002). Linearity indicates the degree to which informal hierarchical relations in a team are transitive (i.e., do not include cyclical influence relations; Chase, 1980). To calculate linearity, we asked all team members to indicate which

individual in each dyad is more influential. For each dyad, the answer options were: (1) member A was more influential than member B; (2) member B was more influential than member A; and (3) members A and B were equally influential. To circumvent order-effects, dyads were presented following Ross's (1939) ordering method.

To calculate informal influence linearity, we created two influence matrices for each team (Chase, 1980). In the first matrix, each cell captured the percentage of team members that rated a specific member as more influential. In the second matrix, each cell captured the percentage of members that rated the influence relation between two specific members as tied. Adding these two matrices (with ties weighted as .5) resulted in a perfectly symmetrical informal influence matrix for each team. These added matrices served as input for calculating linearity scores for each team using Singh, Singh, Sharma, and Krishna's (2003) *h* index:

$$h = [12/(n^3 - n)\ ] \sum [d_a - (n-1)/2]^2$$

$$\text{where } d_a = \sum P_a$$

P_a refers to the proportion of pairwise comparisons in which a team member is rated as influential, and *n* indicates team size. Linearity scores can range from 0 (all influence relations are intransitive) to 1 (all influence relations are transitive).

Performance alignment. We asked formal team leaders to evaluate team member performance by rating them on three items on a scale from 1 (strongly disagree) to 7 (strongly agree): "This team member fulfils his/her tasks to my satisfaction", "This employee fulfills his/her tasks in an effective way", and "In general, this employee shows good work performance" (Turnley, Bolino, Lester, & Bloodgood, 2003). Cronbach's alpha was .91. For the calculation of team member influence, we used the d_a scores from the influence matrices that were also used for the assessment of informal hierarchy. The d_a score represents the sum of the proportions of dyadic comparisons in which a team member is rated as influential. This score was then divided by the number of team members to correct for team size (Singh et al.,

2003). We then calculated the intragroup spearman correlation of influence and performance to arrive at an alignment score for every team.

Dominance alignment. Team members rated their dominance with three items from the Revised Interpersonal Adjective Scales (IAS-R; Wiggins, Trapnell, & Phillips, 1988; see also Anderson & Kilduff, 2009). Specifically, they rated to what extent they were dominant, assertive, and forceful. The items were rated on a scale from 1 (strongly disagree) to 7 (strongly agree). Cronbach's alpha was .68. We used the same influence scores as in our performance alignment measure to calculate the intragroup spearman correlation of dominance and influence.

Team performance. We asked formal leaders to assess the team's performance on the following six criteria: reaching goals, meeting deadlines, work speed, quality of work, productivity and effectiveness (Van der Vegt & Bunderson, 2005). The response set ranged from 1 (far below average) to 7 (far above average). Cronbach's alpha was .87.

Control variables. Given that we gathered data from a diverse sample of teams, we first checked whether teams from different industries, and from differently sized organizations varied in group performance. Also, we investigated whether country of origin and language of the questionnaire significantly impacted the group performance scores. A one-way analysis of variance did not yield significant effects of industry type (F [8,120] = .97, p = .46), organization size (F [3,122] = .91, p = .44), language (F [1,27] = .61, p = .44) or country of origin (F [2,126] = 2.40, p = .10). We therefore excluded these variables in further analyses.

In addition, we included group size and group average tenure as potential covariates, because research demonstrates that these variables relate to group processes and communication (Ancona & Caldwell, 1992; Stewart & Barrick, 2000). Furthermore, to isolate the effect of informal hierarchy strength and the alignment variables, we also controlled for group differences with respect to age, tenure and gender. For age and tenure, we calculated

the intrateam standard deviation of the individual age and tenure scores. Gender composition was operationalized as the percentage of men within a team. Lastly, because we look at the alignment of individual performance and dominance with influence scores, we controlled for the group average and standard deviation of these variables.

Results

Descriptive statistics and correlations

First, we checked whether performance and dominance are indeed important independent determinants of influence at the individual level, as assumed in our theoretical model. In support of this assertion, individual level correlations demonstrate that performance and dominance do not significantly correlate with each other (r = .08, p = .07), but they both significantly correlate with influence (performance, r = .25, p = .00; dominance, r = .12, p = .00). At the individual level, influence also correlates with the demographic variables gender, age and tenure. We focus on this issue in the supplementary analyses-section.

Table 3.1 reports descriptive statistics and bivariate correlations for all study variables on the team level. Of the control variables, both mean individual performance (r = .34, p = .00) and the standard deviation of individual performance (r = -.33, p = .00) were significantly correlated with overall group performance. This finding makes sense, since teams of overall well-performing individuals should have high team performance. The mean level and standard deviation of dominance were both not significantly correlated with team performance (r = .11, p = .21.; r = .13 , p = .15). We decided to include these variables in our regression analyses, however, since they are related to the moderator dominance alignment. Because team size, average team tenure, team tenure diversity, age diversity and gender composition had no significant bivariate association with group performance, we did not include these variables as covariates in further analyses (Becker, 2005).

Table 3.1

Means, Standard Deviations, and Bivariate Correlations

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
1. Team size	6.23	2.69												
2. Average team tenure	4.46	4.15	-.01											
3. Team tenure diversity	3.20	3.52	.07	.83**										
4. Age diversity	7.12	5.14	.20*	.26**	.34**									
5. Gender composition	.61	.34	.05	-.01	-.01	.10								
6. Mean individual performance	5.43	.77	-.03	-.06	-.05	-.08	-.02							
7. SD individual performance	.81	.48	.09	.10	.07	.10	.24**	-.41**						
8. Mean dominance	4.36	.66	.14	-.16	-.07	-.07	.21*	-.11	.14					
9. SD dominance	.95	.44	-.01	-.13	-.11	.13	-.07	-.03	-.15	-.19*				
10. Informal hierarchy strength	.47	.26	.08	-.03	.01	-.05	.13	.17	.05	.02	.02			
11. Performance alignment	.27	.65	.05	.10	.12	.16	.20*	.01	.27**	.08	-.04	.02		
12. Dominance alignment	.11	.64	.01	-.00	.03	.08	.03	-.04	-.04	.10	-.00	.11	-.02	
13. Group performance	5.39	.78	.04	-.04	-.06	-.16	-.10	.34**	-.33**	.11	.13	.06	.04	-.15

Notes. $N = 129$. Gender composition: percentage of men. $^{*}p < .05$, $^{**}p < .01$.

Testing hypotheses

Table 3.2 depicts the results of a moderated hierarchical regression analysis with standardized predictors used to test our predictions for team performance. We entered the control variables in Step 1 and added informal hierarchy strength, performance alignment, dominance alignment and the interaction terms between informal hierarchy strength × performance alignment, and informal hierarchy strength × dominance alignment in Step 2. Importantly, the results demonstrated no significant main effect of informal hierarchy strength on team performance, which is in line with our expectation that the relationship is moderated by performance and dominance alignment. Consistent with hypothesis 1, we found a significant interaction between informal hierarchy strength and performance alignment on group performance (B = .15, p = .02, ΔR^2 = .04). As shown in Figure 3.1, informal hierarchy strength was positively related to team performance when performance alignment was high (+1SD; *B* = .20, *SE* = .09, *p* = .04), but not when performance alignment was low (-1SD; *B* = -.09, *SE* = .08, *p* = .31). Furthermore, results yielded no support for hypothesis 2 as the interaction between informal hierarchy strength and dominance alignment on group performance did not reach significance (*B* = -.01, *SE* = . 07, *p* = .90). We did, however, find a significant main effect of dominance alignment on group performance (*B* = -.17, *p* = .00, ΔR^2 = .04), demonstrating that teams with higher dominance alignment had lower performance scores.

Table 3.2

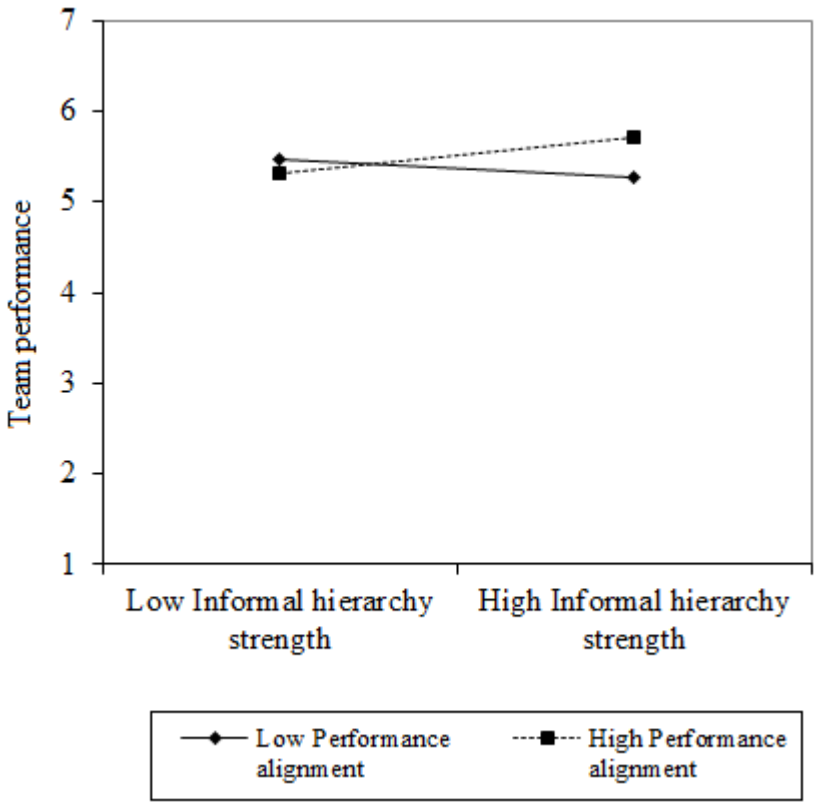
Hierarchical Moderated Regression Results

	Model 1: Group performance	Model 2: Group performance
Control variables		
Mean individual performance	.26 (.08)*	.22 (.08)*
SD individual performance	-.18 (.08)*	-.24 (.08)**
Mean dominance	.23 (.10)*	.19 (.07)**
SD dominance	.25 (.15)	.10 (.07)
Independent variables		
Informal hierarchy strength		.05 (.06)
Performance alignment		.07 (.06)
Dominance alignment		-.17 (.06)**
Interactions		
Informal hierarchy strength × performance alignment		.15 (.06)*
Informal hierarchy strength × dominance alignment		-.01 (.07)
R^2	.20	.28

Notes. N = 129. Values are unstandardized regression coefficients. Standard errors are in parentheses. $^{*}p < .05$, $^{**}p < .01$.

Figure 3.1

Team Performance at Different Levels of Informal Hierarchy Strength and Performance Alignment



Supplementary analyses

Next to performance and dominance, the literature on influence giving and receiving at the individual level argues that diffuse status characteristics, such as team member demographics, also function as important antecedents of influence (i.e., status characteristics theory; Berger et al., 1980). As such, the extent to which team-level informal hierarchy originates from these status characteristics could potentially also shape its outcomes. We believe, however that the alignment of informal hierarchy with such status characteristics will not necessarily have implications for the performance of the team as a whole – not as a main effect, nor as interaction with informal hierarchy strength. This is because the alignment of influence with diffuse characteristics is rather neutral – having men or women, old or young,

or high or low tenured individuals high in the informal hierarchy should not necessarily instill either highly functional or dysfunctional team processes. The diffuse characteristics are generally unrelated to actual performance levels, and therefore do not have a positive influence on team performance in combination with hierarchy strength. Similarly, these characteristics are also not perceived as negative, as is the case with trait dominance, and therefore should not combine with informal hierarchy strength to lead to feelings of unfairness and conflict.

To test this notion, we performed regression analyses with gender alignment, age alignment and tenure alignment (calculated as the intrateam correlation between the respective demographic and influence) and their interaction with informal hierarchy strength as independent variables. In terms of gender alignment, our data included 68 all-male or all-female teams, so we could calculate gender alignment for 61 teams in which there was at least some gender diversity. Regression analyses with these 61 teams demonstrate that gender alignment is not significantly related to performance (controlling for variables in previous analyses; B = -.07, SE = .11, p = .54) and does not interact with informal hierarchy strength to predict performance (B = .00, SE = .11, p = .99). Similarly, results for age alignment demonstrate no significant relationship to team performance, (B = 10, SE = .07, p = .17), and no interaction with informal hierarchy strength (B = .05, SE = .07, p = .48). In addition, results for tenure alignment yield no significant main (B = 09, SE = .06, p = .16) or interaction effect (B = .04, SE = .07, p = .58). We conclude from these results that even though diffuse characteristics relate to influence at the individual level, their alignment with influence does not necessarily positively or negatively influence performance outcomes for the team as a whole.

Discussion

The research reported in this paper examined how informal hierarchy strength combines with information on hierarchy's origins to shape team performance. Across 129 teams, we confirmed the notion that both informal hierarchy strength, and informal hierarchy alignment are important characteristics that both alone and together shape team performance. Specifically, as predicted, strong informal hierarchies were only positive for team performance when influence within the hierarchy was aligned with team member performance. Importantly, dominance alignment appeared to have a direct relationship with team performance – meaning that, irrespective of strength, distributing influence based on team members' dominance leads to worse team performance.

Theoretical implications

The present results advance existing theory and knowledge in several different ways. First, our findings increase our understanding of the team-level effects of building either merit based or dominance based hierarchies. Research at the individual level suggests that both displays of merit or dominance can be fruitful avenues for individuals to gain influence, as such generating all kinds of positive outcomes (e.g., access to resources) for these individuals (Henrich & Gil-White, 2001). On the group level, however, it appears that merit is preferable over dominance as a way to build informal hierarchies. Dominance based hierarchies are negatively related to team performance, irrespective of informal hierarchy strength. This means that founding informal hierarchy on team member dominance may only be positive for a few high ranked, dominant individuals - not for the other team members, and not for the group as a whole.

Second, prior research on informal hierarchies' consequences has predominantly focused on strength as its most important characteristics, highlighting both the potential benefits and downsides of strong informal hierarchies (Greer et al., 2018; Halevy et al., 2011).

Our findings emphasize the importance of incorporating other characteristics of the informal hierarchy as well, as strength alone does not consistently predict team performance. Specifically, our findings reveal that assumptions form the functionalist or conflict accounts – that hierarchies are generally based on team members' merit or dominance respectively – are important to consider when investigating informal hierarchies' outcomes. Importantly, our results highlight the primacy of the functionalist perspective when informal hierarchies are based on the right foundation, while the conflict perspective appears true when informal hierarchies are based on negatively perceived team member characteristics.

Practical Implications

Our findings provide important implications regarding how teams should ideally structure their informal influence relations to reach high team performance. Namely, we show that teams should aim for strong, merit based informal hierarchies, and avoid that team members get into competitive interactions in which dominant individuals potentially 'win the battle for influence'. This may prove difficult for teams to achieve, considering that research demonstrates that the emergence of informal influence relations within informal hierarchy is often an automatic and unconscious process (Tiedens & Fragale, 2003; Tiedens et al., 2007). As a result, team members may automatically and unconsciously give influence to individuals who take charge, even though these people are not necessarily the best performers (Tiedens & Fragale, 2003). These influence-deference relationships may then stabilize over time into a dominance based informal hierarchy that is in fact dysfunctional in terms of improving team performance, because the wrong people are in the wrong places. To prevent this from happening it may be worthwhile for team leaders and managers to actively facilitate processes of performance recognition in groups, by helping team members understand what the different members contribute to the team (Bunderson, 2003; Tarakci et al., 2016).

Strengths, Limitations, and Future Directions

The research presented here has several strengths. First, we collected data from different sources (i.e., team leaders and team members) and used different measurement methods to assess our constructs (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Specifically, the independent variable informal hierarchy strength was measured using a dyadic rating approach among team members, while team performance as the dependent variable was rated by the formal leader on a Likert scale. Furthermore, the moderators performance alignment and dominance alignment were a combination of team member rated influence with leader rated individual performance, and members' self-rated dominance respectively, reducing common method concerns. An additional strength of our study is its generalizability. Due to the diversity of teams in our sample, we believe that our findings should extend to a broad range of work teams.

Despite these notable strengths, some limitations need to be considered when interpreting the present results. First, we acknowledge that our findings do not provide evidence about causality. For example, one might also argue that certain levels of team performance lead team members to re-evaluate their existing hierarchy and change it when they deem necessary. Yet, given that our model is in line with previous theoretical models on the relationship between informal hierarchy strength and team performance, we have confidence in the predicted directions of the relationships. Nonetheless, we recognize a need for evidence verifying this causality inference based on experimental or longitudinal research designs.

Another potential limitation is the reliance on formal leaders' judgments of both team and individual performance, instead of more objective indicators. Although this is an accepted and widely used approach in settings where the teams under study are so diverse (e.g.,

Cantimur et al., 2016), future research that corroborates the present findings using more objective measures of team performance would be helpful to ascertain our results' robustness.

Moreover, it would have been interesting to consider a number of mediating variables, because we believe there are different underlying mechanisms of why our study variables relate to team performance. Specifically, based on our theoretical reasoning, we expect the positive interaction of informal hierarchy strength with performance alignment to be driven by team members' fulfilment of their need for structure, intragroup learning and improved coordination. In contrast, the negative effect of dominance alignment is most likely driven by team members' legitimacy perceptions, conflict and competition (see also Bunderson et al., 2016; Greer et al., 2018). The inclusion of these mediating variables would shed light on which of these processes are primarily influenced by the combination of hierarchy strength and alignment, and could facilitate closer theoretical alignment with the functional and conflict perspectives on informal hierarchy that have focused on these different mechanisms as well.

CHAPTER 4

Informal Hierarchy and Team Creativity: The Moderating Role of Empowering Leadership

Abstract

Although there is growing evidence that strong informal influence hierarchies can enhance teams' core task performance, recent theorizing suggests that such informal hierarchies may, at the same time, stifle team creativity. The current study draws from the Motivated Information Processing in Groups (MIP-G) model to empirically examine this latter notion. Moreover, we build on functional leadership theories to propose that the link between informal hierarchy strength and team creativity hinges on a formal team leader's empowering leadership. Using a sample of 56 organizational work teams from a wide range of industries, we found that stronger informal influence hierarchies related negatively with team creativity when the formal leader exhibited little empowering behavior. When the formal leader acted in more empowering ways, by contrast, this negative relationship was dampened. These findings provide new knowledge on the role of informal influence hierarchies for team creativity and advance our understanding of how informal hierarchical relations and formal leadership processes can jointly shape important team outcomes.

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CHAPTER 4: INFORMAL HIERARCHY AND TEAM CREATIVITY

Informal hierarchies, defined as naturally developed influence differences between individuals, are considered a universal feature of many groups and teams (Leavitt, 2004; Magee & Galinsky, 2008; Mazur, 1985). Scholars have proposed that teams can benefit from a strong informal influence hierarchy because it offers clarity about who yields influence over whom and, thus, facilitates smooth within-team interactions (Anderson & Brown, 2010; Halevy et al., 2011; Magee & Galinsky, 2008). Empirical evidence increasingly supports this notion, suggesting that strong informal hierarchies may reduce conflict within teams, facilitate coordination, and enhance team performance, particularly in teams working on complex and interdependent tasks (Bunderson et al., 2016; Ronay et al., 2012).

Yet, this prior work has primarily examined the consequences of stronger or weaker informal hierarchies for a team's core processes and performance (i.e., immediate task accomplishment). It remains an open question, therefore, whether strong informal hierarchies are equally advantageous for other important aspects of team functioning. Team creativity (i.e., a team's production of novel and useful ideas; Amabile, 1983; Madjar, Oldham, & Pratt, 2002), in particular, represents a critical outcome variable that may profoundly shape a team's ability to reach high-quality decisions and innovative outcomes (Amabile, 1988; Zhang & Bartol, 2010) – and there are good theoretical reasons to assume that the consequences of a team's informal influence hierarchy are different for team creativity than core task performance (Ford, 1996; Madjar et al., 2011).

Specifically, the Motivated Information Processing in Groups (MIP-G) model suggests that teams are most creative when they are motivated to engage in deliberate information processing (De Dreu et al., 2011; Hinsz, Tindale, & Vollrath, 1997). Deliberate information processing is stimulated, for example, by constructive controversy and dissent, which enables team members to build on each other's ideas and helps them to jointly reach creative solutions (De Dreu et al., 2011). Rather than stimulating constructive dissent, member inputs, and

conjoint decision-making, however, strong informal influence hierarchies may create an environment in which team interactions are dominated by individuals at the top of the hierarchy. Creative discourse within the team may be minimized, then, as lower-level members' idea sharing and independent contributions are suppressed (Berdahl & Martorana, 2006; Islam & Zyphur, 2005). Accordingly, a strong informal hierarchy may negatively (rather than positively) associate with team creativity.

Importantly, however, teams are usually not governed by their informal influence relations alone. Most organizational teams also have official leadership structures, as typically represented by a formal leader in charge of managing team processes and outcomes (e.g., supervisors or managers vested with formal authority by the organization; Devine, et al., 1999; Zaccaro et al, 2001). To fully understand the relationship between informal influence hierarchies and team creativity, we posit that it is crucial to take into account such formal leadership aspects. Scholars have suggested an empowering leadership style (i.e., formal leadership behavior that encourages team members to express their opinions and participate in collaborative decision making; Lorinkova et al., 2013) to be particularly relevant for stimulating team creativity (Arnold, Arad, Rhoades, & Drasgow, 2000; Srivastava et al., 2006; Zhang & Bartol, 2010). Consequently, we cast formal leaders' empowering behavior as a key moderating factor that may counteract the detrimental consequences associated with strong informal hierarchical differentiation and, thus, buffer the negative relationship between a team's informal hierarchy strength and creativity.[5]

We investigate this notion using multi-source data from a diverse sample of 56 organizational work teams. In doing so, we strive to build and test new theory on the

[5] Although formal empowering leadership behavior may motivate individual members to engage in influence attempts within the team (Carson et al., 2007), such behavior is unlikely to determine whether team members are willing to yield to others' respective influence attempts (DeRue & Ashford, 2010; Tiedens & Fragale, 2003). It appears plausible to assume, therefore, that empowering leadership and a team's informal hierarchy strength may vary independently from one another.

relationship between informal hierarchy strength and team creativity, thus making a number of important contributions to the team literature. First, we shed light on team creativity as a heretofore neglected outcome of informal hierarchy strength. As such, we hope to demonstrate that the same factors previous research has shown to benefit teams' core task performance (i.e., a strong informal influence hierarchy; He & Huang, 2011; Ronay et al., 2012) may also explain why teams find it difficult to reach high creativity as an alternative (and oftentimes equally vital) outcome. Second, the existing work on informal team hierarchies has often neglected the concurrent role of a team's formal hierarchy (McEvily et al., 2014). By addressing this issue, we aim to illustrate that informal and formal hierarchical relations should be examined in conjunction to more fully understand their complex and interrelated associations with key team outcomes.

Theory and Hypothesis Development

Informal Hierarchy Strength: Definition and Prior Research

A team's informal influence hierarchy reflects the overall pattern of dyadic influence relations between a team's members (Bunderson et al., 2016; Chase, 1980; Everett & Krackhardt, 2012), with influence representing an individual's ability to change another team members' actions in some intended fashion (Thibaut & Kelley, 1959). Dyadic influence differences may arise from differentiation across a wide variety of valued dimensions, including individuals' perceived competence, personality characteristics, demographic traits (e.g., age, tenure or education), and formal rank within the organization (Anderson & Kilduff, 2009; Berger et al., 1980; Magee & Galinsky, 2008). Given the present study's interest in the consequences of *informal* team hierarchy, we focus on influence relations between peers (i.e., team members that do not differ in formal rank). In doing so, we aim to avoid potential confounds between aspects of a team's formal and informal hierarchy.

In a strong informal hierarchy, team members' influence relations are structured in a

clear-cut, unidirectional, top-down, and acyclical manner, such that individual members do not have direct or indirect influence over someone who has direct or indirect influence over them (Krackhardt, 1994). Put differently, "influence relations in a true hierarchy are cascading and, like water cascading over rocks, never flow upstream" (i.e., when member A has influence over B, member B cannot yield influence over A at the same time; Bunderson et al., 2016, p. 1268). Within weaker informal hierarchies, by contrast, members' informal influence relations do not consistently follow this downward-cascading principle. If member A has influence over B, for example, member B may also be able to yield direct or indirect influence over A. In other words, at least some team members in lower positions within the informal hierarchy (i.e., with informal influence over relatively few others) can influence more highly positioned members (i.e., with influence over a larger number of others), and there may be patterns of reciprocal influence (Everett & Krackhardt, 2012; Krackhardt, 1994). These cyclical and/or reciprocal relations break the clear downward stream of influence, diminish the clarity of a team's informal influence-ordering, and create ambiguity about who is in charge (Bunderson et al., 2016).

On this basis, scholars have concluded that strong informal influence hierarchies may prove beneficial for teams' core task performance (Anderson & Brown, 2010). Strong informal hierarchies may facilitate complementarity of members' actions (i.e., one leads, the other follows), thus paving the way for smooth cooperation and coordination (De Kwaadsteniet & van Dijk, 2010; Tiedens & Fragale, 2003). Supporting this notion, research has shown that dyadic collaborations with strong influence differentials require less explicit consultation (compared to more egalitarian dyads), as both partners more clearly understand who should defer to whom when it comes to decision-making (de Kwaadsteniet & van Dijk, 2010). Collaborative dyads with clear-cut influence differences have been shown, accordingly, to outperform more egalitarian dyads in coordination-intensive tasks (Estroff &

Nowicki, 1992; Tracey & Sherry, 1993). Similarly, recent team-level studies have illustrated that a strong informal hierarchy can facilitate team task performance, particularly in task environments that require intricate coordination between members (Bunderson et al., 2016; Halevy at al., 2012; Ronay et al., 2012).

Informal Hierarchy Strength and Team Creativity

Research suggests that it is important to distinguish teams' core task performance and creativity as distinct outcome variables, because processes that favor a team's core task performance may negatively affect its ability to be creative, and vice versa (Ford, 1996; Madjar et al., 2011). After all, markedly different inputs are required for routine task performance (e.g., efficient, standardized, habitual actions) rather than creative outputs (e.g., effective retrieval and processing of information, new idea development; Madjar et al., 2011). Hence, although the research reviewed above has shown strong informal influence hierarchies to potentially strengthen teams' core task performance, we expect such hierarchies to aggravate team creativity.

We build on the Motivated Information Processing in Groups (MIP-G; De Dreu, Nijstad, & van Knippenberg, 2008) model to support this notion. This model postulates that teams, much like individuals, have to process information to enable task performance and creativity (Hinsz et al., 1997; Laughlin, VanderStoep, & Hollingshead, 1991). In doing so, teams can utilize two distinct information processing types that differentially shape their outputs. On the one hand, teams can follow a relatively shallow information processing strategy that primarily relies on generalized heuristics and routines. This strategy fits well when teams engage in day-to-day, standardized activities that require efficient core task accomplishment, but it is likely to hinder team creativity (Bechtoldt et al., 2010). On the other hand, teams can engage in more deliberate information processing, characterized by the systematic and effortful evaluation of all relevant information available within the team and

its environment. Such deliberate processing has the potential to enhance a team's creativity, as it facilitates access to novel inputs, approaches, and solutions (Chaiken & Trope, 1999; De Dreu et al., 2011).

Although it is difficult to pinpoint the exact processes, research using the MIP-G perspective points to a variety of factors associated with motivated information processing and, thus, team creativity. Examples of such factors are members' participation in decision making, minority dissent, and constructive controversy (Amabile, Conti, Coon, Lazenby, & Herron, 1996; De Dreu & West, 2001; Nemeth, Personnaz, Personnaz, & Goncalo, 2004). Members' broad participation in making team decisions is important for creativity, for instance, because it increases the likelihood that diverse views, perspectives, and approaches are shared within the team (Amabile et al., 1996; West, 2002). In fact, brainstorming techniques established to increase team creativity often focus on designing an environment in which all members feel free to provide their inputs (Paulus, 2000). Furthermore, minority dissent, which occurs when a minority openly opposes the opinion of a team's majority, is critical for a team's creative performance (Smith, Paulus, & Nijstad, 2003). After all, teams will only be able to recognize and incorporate diverse, novel, and non-intuitive ideas if a minority with divergent opinions can openly express opposing views (De Dreu & West, 2001; Nijstad, Berger-Selman, & De Dreu, 2014). And finally, constructive controversy has been found to increase team creativity, because it forces team members to think about opposing positions and to reconcile different perspectives – creating the possibility of new, creative combinations of the information available within the team (Nemeth et al., 2004). Consequently, factors that stimulate member participation, minority dissent, and constructive disagreements may strengthen a team's creative potential, whereas factors that encourage conformity, agreement, and uniform opinions are likely to diminish team creativity (Chirumbolo, Livi, Mannetti, Pierro, & Kruglanski, 2004; Goncalo & Staw, 2006).

Drawing from this theoretical backdrop, we propose that the strength of a team's informal hierarchy may negatively relate with team creativity by diminishing the key aspects of a team's deliberate information processing discussed before. In teams with weaker informal hierarchies, members share similar influence over each other and have similar chances to participate in team decision-making, voice concerns, and provide constructive criticism and recommendations (Choi, 2007). Weak informal hierarchies may, therefore, stimulate deliberate information processing between a team's members, contributing to the team's creative success. Stronger informal influence hierarchies, in contrast, establish clear influence differences between team members, such that more highly positioned members may dominate team decisions, whereas others are silenced (Bales et al., 1951; Camacho & Paulus, 1995). As a result, team members with lower influence are less likely to participate in decision-making and express dissent, reducing potentials for constructive controversy. Diminishing a team's deliberate information processing, this should prove detrimental for team creativity.

Consistent with this reasoning, research has shown that individuals in positions of superior influence are often allowed to control team interactions, while members with less influence tend to defer to the respective decisions and keep their opinions to themselves (Anderson, Srivastava, Beer, Spataro, & Chatman, 2006; Keltner et al., 2003). Similarly, individuals positioned at the lower levels of an informal hierarchy are often reluctant to share ideas and refrain from voicing their views in the presence of more influential authority figures (Mullen et al., 1991). Even when team members with lower influence do speak up, strong informal hierarchical differences frequently lead others to place greater value on the opinions and ideas of more highly positioned individuals, such that inputs from members in lower positions of the informal hierarchy carry less weight in shaping a team's decisions and actions (Galinsky, Magee, Inesi, & Gruenfeld, 2006). Consequently, by reducing critical team

processes such as participation in decision making, minority dissent, and constructive controversy, stronger informal influence hierarchies should decrease the likelihood that teams will effectively consider and incorporate all of their members' thoughts, ideas, and suggestions, limiting the deliberate processing of diverse perspectives necessary for producing creative output (Berdahl & Martorana, 2006; Berger et al., 1980; Galinsky, Magee, Gruenfeld, Whitson, & Liljenquist, 2008).

Importantly, we further suggest that the relationship between informal hierarchy strength and team creativity may be more complex than the above reasoning seems to suggest. Beyond an informal influence hierarchy between peer members, in particular, most organizational teams are also characterized by formal leadership structures (e.g., through formal supervision). Hence, scholars have emphasized the importance of conjointly examining both formal *and* informal hierarchical aspects to realistically depict the consequences of a team's hierarchical differentiation for team processes and outcomes (Blau & Scott, 1962; Magee & Galinsky, 2008; McEvily et al., 2014). Building on this notion, we draw from functional leadership theories (e.g., Morgeson et al., 2010) to propose that a formal team leader's behavior will serve as a critical boundary condition for the potentially negative linkage between informal hierarchy strength and team creativity.

The Moderating Role of Formal Empowering Leadership

Functional leadership theories argue that formal team leaders' most important role is to help teams to improve in areas in which their performance is not up to par (Fleishman et al., 1991; Morgeson et al., 2010). Hence, formal leaders' key function is "to do, or get done, whatever is not being adequately handled for group needs" (McGrath, 1962, p. 5). When it comes to motivated information processing, *empowering leadership* appears to be a particularly promising leadership style that may help teams to overcome key obstacles toward reaching high creativity (Raub & Robert, 2010; Zhang & Bartol, 2010).

Specifically, empowering leaders encourage team members to openly express opinions and ideas, promote participation in collaborative decision-making, and support information sharing and teamwork (Arnold et al., 2000; Lorinkova et al., 2013; Sharma & Kirkman, 2015). As such, we expect this type of formal leadership behavior to buffer the negative relationship between informal hierarchy strength and team creativity by counterbalancing a strong informal hierarchy's potentially detrimental consequences for a team's deliberate information processing. Indeed, a highly empowering formal leader's promotion of open information sharing and free expression of ideas may ameliorate the tendency of teams with a stronger (rather than weaker) informal hierarchy to suppress or ignore minority dissent and prohibit constructive controversy, thus diminishing a stronger informal hierarchy's negative implications for these key sources of team creativity (cf. De Dreu & West, 2001; Nemeth et al., 2004). Similarly, a formal leader's empowering behavior may preserve members' motivation to engage in critical thinking even within a stronger informal hierarchy. Such leadership may, in particular, increase lower-level members' tendency to share ideas and opinions, creating a psychologically safe team climate in which even less influential individuals dare to speak up despite strong informal hierarchical differentiation (Gao, Janssen, & Shi, 2011; Srivastava et al., 2006; Zhang & Bartol, 2010).

For teams with a less empowering formal leader, in contrast, we expect that the negative relationship between informal hierarchy strength and team creativity will be particularly pronounced. Although they may not deliberately prohibit members' participation, such leaders offer no active support for team members' voice, and they do not encourage members to share ideas and opinions and partake in team decisions (Arnold et al., 2000; Lorinkova et al., 2013). Consequently, when the formal leader refrains from empowering behavior, he or she does little to counteract the tendencies toward restricted participation, minority dissent, and constructive controversy that are frequently present in teams with a

strong informal hierarchy. Members at lower levels of the informal hierarchy may find it particularly problematic, then, to effectively voice their opinions and ideas, rendering it difficult for more hierarchical teams to uphold high creativity levels when their formal leader exhibits a lack of empowering behavior. Teams with a relatively weak informal hierarchy, by contrast, may be in a better position to reach high creativity even if their formal leader is not empowering. Without pronounced informal influence differences, the members of such teams may find it easier to contribute their unique ideas, to challenge each other's opinions, and to share minority perspectives – even if their leader does not explicitly encourage and support such behaviors (Amabile et al., 1996; De Dreu & West, 2001; Nemeth et al., 2004). Consequently, we anticipate that with a non-empowering formal leader, teams that exhibit a weaker (rather than stronger) informal hierarchy will be able to reach higher creativity levels.

Hypothesis 1. Formal empowering leadership behavior moderates the relationship between informal hierarchy strength and team creativity. This negative relationship is less pronounced when empowering leadership is higher rather than lower.

Method

Sample and Procedures

Because the effects of hierarchy may vary across team types (Bunderson et al., 2016), we collected data from a diverse sample of teams, relying on both our research group's and university's contacts (for similar approaches see Bunderson et al., 2016; Mayer, Aquino, Greenbaum, & Kuenzi, 2012). In order to identify teams, we relied on a standardized data collection protocol, and we approached teams based on the criteria that they (a) consisted of four or more members, (b) internally coordinated efforts for joint goal accomplishment, (c) contained members that frequently interacted face-to-face, and (d) consisted of members with interdependent tasks (Kozlowski & Bell, 2003). We contacted teams' formal leaders and invited them to participate in a study about work team functioning. When the formal leader

agreed to participate, he/she provided additional information, including all team members' names (required for measuring informal hierarchy strength; see below).

Of the 63 work teams that had initially agreed to participate in the study, seven teams were excluded because less than 50% of the members provided the data necessary to assess informal hierarchy strength (cf. Bunderson, 2003). The final sample thus consisted of 56 teams, comprising 248 members and 56 leaders. Members' average team tenure was 5.76 years (*SD* = 6.32), their average age was 36.47 years (*SD* = 13.55), and 47.2% were female. Eighty-nine percent of the team members had a vocational degree or higher. For the formal leaders, average team tenure was 9.03 years (*SD* =8.55), average age was 42.77 years (*SD* =10.15), 35.7% were female, and 94.6% had a vocational degree or higher.

The sample teams came from organizations operating in different industries across the Netherlands, such as retail (33.9%), education (16.1%), construction (14.3%), government (7.1%), business services & finance (8.9%), hospitality (10.7%), health care (5.4%), and ICT (3.6%). Twenty of the teams worked in small organizations with fewer than 20 employees, 15 teams in organizations with 20 to 99 employees, 15 teams in organizations with 100 to 499 employees, and 5 teams in organizations with 500 or more employees (for one organization, this data was missing).

Measures

Informal hierarchy strength. As noted before, formal and informal aspects of hierarchical differentiation within teams can be related, as formal rank differences may be a source of informal influence (McEvily et al., 2014; Ravlin & Thomas, 2005). Hence, to clearly separate between these constructs, we measured informal hierarchy strength among peers with equivalent formal ranks in their teams (i.e., the respective measure did not include the formal team leader). Following prior research (Bunderson et al., 2016; Everett & Krackhardt, 2012), we captured teams' informal hierarchy strength using a dyadic rating

approach. Team members were presented with the names of all of their teammates, and they were asked to indicate to what extent each of these individuals exerted influence over them. Answering options were 1 = "not at all"; 2 = "somewhat"; 3 = "to a large extent". Given that (a) the calculation of informal hierarchy strength requires dichotomous data (Krackhardt, 1994), and (b) only 7.1% of the respondents indicated that another team member exerted influence over them "to a large extent" (52.2% of the responses were in the "not at all" category, and 40.7% in the "somewhat" category), we collapsed the latter two categories to create a dichotomous variable (0 = "not at all"; 1 = "somewhat/to a large extent"). We subsequently summarized all dyadic influence ratings into an influence matrix for each team, indicating which team members influenced which other members. Based on these matrices, we calculated the number of symmetrical dyads (i.e., A and B mutually influence each other, directly or indirectly) and asymmetrical dyads in each team (i.e., influence only flows one way, such that A influences B, but B does not influence A; or team member A and B do not influence each other). Of the 427 rated dyadic relationships within the 56 sample teams, 169 were symmetrical (39.6%) and 258 were asymmetrical (60.4%). The information from the influence matrices served as input for Krackhardt's (1994) network hierarchy measure at the team level, calculated as $1 - [v / \max(v)]$, where v is the number of dyads with symmetrical influence and max(v) is the total number of dyads in a team. Hierarchy values could range from 0 (i.e., low informal hierarchy strength, with symmetrical influence across all dyads in the team) to 1 (i.e., high informal hierarchy strength, with no symmetrical influence across any dyad in the team).

Empowering leadership. Formal leaders' empowering behavior was rated by all of their team members using seven items from Lorinkova et al., (2013). Example items include, "The team leader gives the team autonomy and freedom of action" and "The team leader encourages team members to exchange information with one another". Items were rated on a

scale from 1 (strongly disagree) to 7 (strongly agree). Cronbach's alpha was .90, and aggregation statistics supported aggregation to the team level, ICC1 = .21, $p < .01$; ICC2 = .54; mean $r_{wg(j)}$ = .83 (using a rectangular reference distribution; Bliese, 2000; James, Demaree, & Wolf, 1984).

Team creativity. Formal leaders rated their team's overall creativity using an adapted six-item measure from Zhou & George (2001; items were framed to reflect the team instead of the individual level) on a scale from 1 (strongly disagree) to 7 (strongly agree). The items were: "To what extent does your team suggest new ways to achieve goals or objectives?", "…search out new work methods, processes and techniques?", "…come up with creative solutions to problems?", "…come up with new ways to increase quality?", "…suggest new and practical ideas to improve performance?" and "…provide new ways of performing work tasks?". Cronbach's alpha was .95.

Control variables. Given that we gathered data from a diverse sample of teams, we considered a number of control variables to account for possible creativity differences due to industry or task characteristics. Specifically, we checked whether teams from different industries varied in creativity. A one-way analysis of variance on team creativity did not yield significant industry effects, however (F [7,48] = 1.61, p = .16). Moreover, we considered teams' task complexity and environmental turbulence as control variables when testing the hypothesis because these aspects may shape the extent to which teams face internal and external demands for creativity (Akgün, Byrne, Lynn, & Keskin, 2007; De Dreu et al., 2011). *Task complexity* is defined as the clarity, routineness, and predictability of team tasks (Withey et al., 1983). We measured this construct in the team member questionnaire using eight items (Withey et al., 1983; reverse-coded sample item: "We follow an understandable sequence of steps in performing our group tasks"; 1 = strongly disagree; 7 = strongly agree). Cronbach's alpha was .81, and aggregation statistics supported aggregation to the team level (ICC1 = .42,

$p < .01$; ICC2 = .76, mean $r_{wg(j)}$ = .85). *Environmental turbulence* reflects the extent to which changing technologies and customer preferences are present within a team's environment (Akgün & Keskin, 2014). We measured this construct in the leader questionnaire using a six-item instrument by Akgün and Keskin (2014; sample item: "Customer preferences change quite a bit over time"; 1 = strongly disagree; 7 = strongly agree). Cronbach's alpha was .79.

Also, we calculated connectedness scores for all teams in our sample, to explore whether the absence of influence relations between some members may have biased our results. A team's connectedness describes the extent to which all of its members are connected by at least one influence relation (Krackhardt, 1994). Connectedness is computed as 1 - [(W-1)/(n-1)], where W is the numbers of team members that do not have an influence relation with any other members, and n is the overall number of team members. A score of 1 means that the entire team is connected (so there is at least one influence relation from or to every team member), a score of 0 means that there are no influence relations at all.[6]

Additionally, we considered both team size and average team tenure as potential control variables because past research suggests that these features can influence team processes and outcomes (e.g., Ancona & Caldwell, 1992; Finkelstein & Hambrick, 1990).

Finally, we measured teams' core task performance in the leader survey to (a) control for this construct when testing the hypothesis and (b) explore possible difference in the role of informal hierarchy strength for different performance dimensions (i.e., team creativity vs. core task performance. Following Van der Vegt and Bunderson (2005), formal leaders rated their team's efficiency, ability to meet deadlines, speed of work, productivity, and quality of work on a scale from 1 (strongly disagree) to 7 (strongly agree; Cronbach's alpha = .78).

[6] Notably, a large majority (87.5%) of the teams in our sample had connectedness scores of 1. To probe our findings' robustness, we repeated our hypothesis tests both with and without the seven teams that had less-than-perfect connectedness scores. The pattern of results was virtually identical across both analyses and yielded equivalent conclusions. Hence, we decided to only report full-sample results.

Results

Descriptive Statistics

Table 4.1 reports descriptive statistics and bivariate correlations for all study variables. As shown, informal hierarchy strength was not significantly correlated with either team creativity or empowering leadership. Of the potential covariates, task complexity (r = .31, p = .02), environmental turbulence (r = .28, p = .04), and task performance (r = .60, p = .00) correlated significantly with team creativity, whereas there was no significant correlation with team creativity for connectedness, team size, and average team tenure. Furthermore, although the correlation between teams' task performance and creativity may seem relatively high, we note that (a) previous work has reported similar correlations, and (b) a positive association between these constructs is to be expected – despite their theoretical distinctiveness – because both aspects are general indicators of well-functioning teams (e.g., Harris, Li, Boswell, Zhang, & Xie, 2014; Madjar et al., 2011).

Table 4.1

Means, standard deviations and correlations of study variables

Variables	*M*	*SD*	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Task complexity	4.01	.76									
2. Environmental turbulence	4.41	1.07	.17								
3. Task performance	5.45	.89	.20	.16							
4. Connectedness	.92	.21	.12	.07	-.08						
5. Team size	5.66	1.53	-.16	-.07	.03	-.07					
6. Team average tenure	5.51	5.08	-.04	-.05	.10	-.18	.11				
7. Informal hierarchy strength	.61	.38	-.26^{+}	-.13	-.02	-.11	-.04	-.12			
8. Empowering leadership	5.14	.68	.30*	-.02	.28*	.13	-.01	-.11	-.13		
9. Team creativity	4.85	1.22	.31*	.28*	.60**	.10	.05	-.18	-.21	.31*	

Notes. $N = 56$. $^{**}p < .01$, $^{*}p < .05$, $^{+}p < .10$

Hypothesis Testing

Table 4.2 summarizes the results of a moderated hierarchical regression analysis (with standardized predictors) on team creativity. We entered the control variables that were significantly correlated with the dependent variable (i.e., team performance, task complexity, and environmental turbulence; cf. Becker, 2005) in Step 1 and added informal hierarchy strength and empowering leadership in Step 2. The results demonstrated no significant main effects of informal hierarchy strength and empowering leadership on team creativity.

To test our moderation hypothesis, we entered the interaction term of informal hierarchy strength and empowering leadership in Step 3 of the regression analysis. As expected, we observed a significant informal hierarchy strength × empowering leadership interaction on team creativity (B = .25, SE = .11, p =.03). Figure 4.1 depicts the pattern of this interaction (Aiken & West, 1991). Simple slope analyses revealed that informal hierarchy strength did not significantly relate with team creativity when formal leaders exhibited relatively strong empowering leadership behavior (+1 SD: B = .09, SE = .17, p = .61). With relatively low empowering leadership (-1 SD), however, the negative relationship between informal hierarchy and team creativity was significant (B = -.42, SE = .17, p = .02). We note that the pattern and interpretation of these results remained virtually unchanged (a) when excluding all control variables and (b) when incorporating connectedness, team size and average team tenure as additional covariates.[7]

[7] To further explore our findings' robustness, we tested our hypothesis using a micro-macro multilevel model in MPlus, incorporating empowering leadership as a disaggregated Level-1 variable (Croon & Van Veldhoven, 2007; Mehta & Neale, 2005; K.J. Preacher, Zyphur, & Zhang, 2010). The respective results yielded a significant informal hierarchy strength × empowering leadership interaction (B = .55, SE = .28, p = .05), and the pattern of this interaction was consistent with our main analyses.

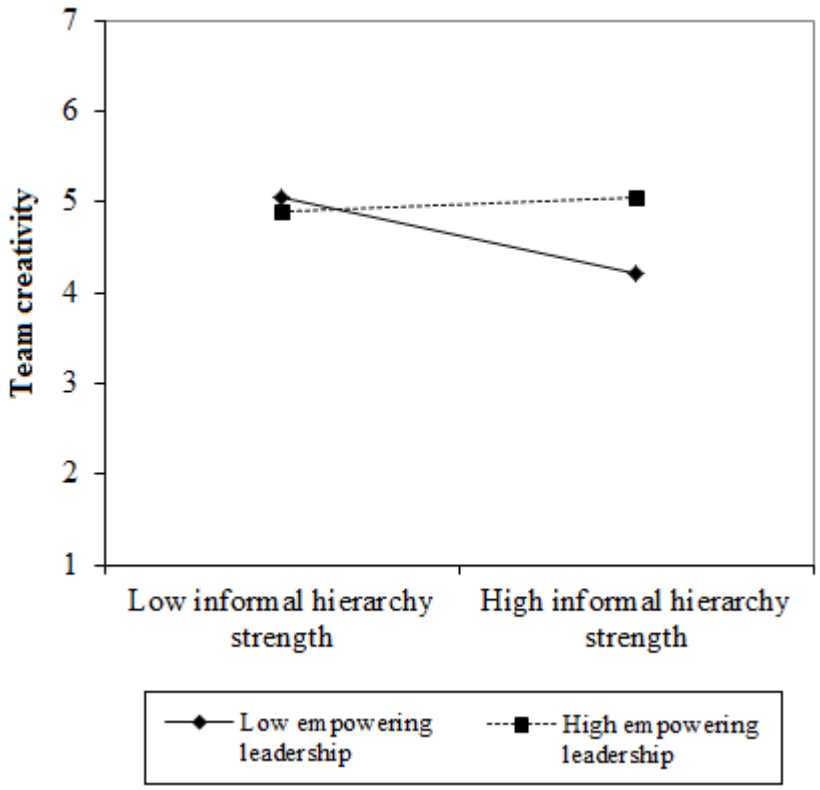
Table 4.2
Regression Results of Moderation Analyses on Team Creativity

	Step 1	Step 2	Step 2
Control variables			
Task complexity	.22 (.13)	.14 (.14)	.14 (.13)
Environmental turbulence	.19 (.13)	.19 (.13)	.19 (.12)
Team performance	.64 (.13)**	.62 (.13)**	.59 (.13)**
Independent variables			
Informal hierarchy strength		-.16 (.13)	-.17 (.13)
Empowering leadership		.13 (.14)	.17 (.13)
Interaction			
Informal hierarchy strength × empowering leadership			.25 (.11)*
Interaction R^2			.05
R^2	.42	.45	.50

Notes. N = 56. Values are unstandardized regression coefficients. Standard error estimates are in parentheses. * $p < .05$.

Figure 4.1

Team Creativity at Different Levels of Informal Hierarchy Strength and Empowering Leadership



Supplementary Analyses

To further explore our results, we examined whether the observed informal hierarchy strength × empowering leadership interaction was unique to team creativity, or whether a similar interaction could be found for core task performance. Repeating our analyses with this alternative dependent variable (including the control variables team creativity, task complexity, and environmental turbulence) did not yield a significant interaction of informal hierarchy strength and empowering leadership (B = -.06, SE = .09, p = .55). This pattern of results remained unchanged both when excluding all control variables and when including connectedness, team size, and average team tenure as additional covariates. We therefore

conclude that the present interaction findings are unique to creativity as a specific team outcome.

Moreover, although we did not find a significant main effect of informal hierarchy strength on teams' core task performance, supplementary analyses revealed a significant informal hierarchy strength × task complexity interaction on task performance (B = -.36, SE = .15, p = .02, without control variables). Consistent with previous research (e.g., Bunderson et al., 2016; Ronay et al., 2012), informal hierarchy strength and teams' task performance were positively related under conditions of higher task complexity (+1 SD; B = .32, SE = .17, p = .06) but negatively related under conditions of lower task complexity (B = -.40, SE = .21, p = .06). The pattern of results remained very similar when adding all of the control variables (i.e., team creativity, environmental turbulence, connectedness, team size, and average team tenure), although the negative simple slope under conditions of relatively low task complexity became non-significant in these additional analyses (B = -.19, SE = .18, p = .31). Further details on these auxiliary analyses are available from the first author.

Discussion

This study examined the joint role of informal hierarchy strength and formal empowering leadership for team creativity. Results supported the hypothesized moderation model, demonstrating that the relationship between informal hierarchy strength and team creativity was negative only when formal team leaders exhibited little empowering behavior, but not when formal empowering leadership was more pronounced. It appears, therefore, that empowering formal leaders can ameliorate creativity problems that might otherwise occur in teams with a strong informal hierarchy, enabling such teams to reach creativity levels comparable to those obtained in teams with weaker informal influence hierarchies. In other words, our results indicate that teams are less creative when they both exhibit a strong informal hierarchy *and* lack formal empowering leadership. When a team's informal

hierarchy is less pronounced or when its formal leader exhibits empowering behavior, by contrast, these creativity losses are less likely to ensue. These findings extend previous research in several important ways.

First, the current results advance knowledge on the consequences of teams' informal influence hierarchies. The existing research has mostly identified positive relationships between informal hierarchy strength and teams' core task performance, particularly in complex task settings (Bunderson et al., 2016; Ronay et al., 2012) and the present study's supplementary analyses support these findings. So far, however, important alternative outcomes associated with teams' informal hierarchies, such as team creativity, have been largely absent from consideration. This is particularly interesting because previous work has shown that team processes favoring task performance are often in contrast with those favoring creativity (Ford, 1996; Madjar et al., 2011). In line with this reasoning, the present study has drawn from the MIP-G model (De Dreu et al., 2011) to show that a strong informal hierarchy can negatively associate with team creativity, particularly if a team's formal leader does not exhibit empowering behavior. As such, the present results demonstrate that strong informal hierarchies are not uniformly beneficial. Rather, the consequences associated with a team's informal influence hierarchy seem to depend on the outcome under investigation. Future research could benefit from further examining this notion by incorporating different types of team processes and outcomes to paint a more complete picture of the beneficial and detrimental effects of teams' informal hierarchical differentiation.

Second, scholars investigating the consequences of hierarchies in teams have called for an integrative perspective that includes both formal and informal elements of hierarchical differentiation (Blau & Scott, 1962; Diefenbach & Sillince, 2011; McEvily et al., 2014). Empirical work, however, has mostly focused on either one of these hierarchy types, leaving the literatures on formal and informal hierarchies largely disconnected (Soda & Zaheer,

2012). In the current study, we bring together these disparate lines of inquiry by showing that formal team leaders play a crucial role in shaping the consequences of informal hierarchical differentiation. Building on functional leadership theories (Fleishman et al., 1991; McGrath, 1962; Morgeson et al., 2010), we demonstrate that formal team leaders may mitigate potentially negative effects of informal team hierarchies by empowering their members. As such, our research lends support to the notion that formal and informal hierarchical elements conjointly affect team processes and outcomes, and it alerts scholars to the importance of simultaneously incorporating both of these elements in future research endeavors.

Practical Implications

The present results demonstrate that formal leaders play a critical role in determining whether a strong informal influence hierarchy is detrimental for teams' creative performance. By engaging in empowering leadership behaviors, formal team leaders may buffer informal hierarchies' potentially negative creativity effects. Hence, this type of leadership seems particularly important in teams characterized by strong informal hierarchical differentiation, and organizations may benefit from encouraging formal leaders' empowering behavior in such teams (e.g., by rewarding this type of behavior or emphasizing it in their leadership development efforts). In fact, teams with strong informal hierarchies *and* highly empowering formal leaders may be able to capitalize on the coordinative and structuring advantages of a strong informal hierarchy (potentially boosting their core task performance when faced with complex tasks; Halevy et al., 2012; Ronay et al., 2012) – without suffering from potential creativity losses at the same time.

Strengths, Limitations, and Future Research Directions

An important strength of the present research is that we collected data from a variety of real-life teams operating in diverse organizations and business sectors, thus strengthening our findings' generalizability. Furthermore, data were collected from both team members and

formal leaders, using distinct measurement and aggregation approaches for the different constructs. For example, informal hierarchy strength was calculated based on peer ratings of influence, whereas creative performance was rated by team leaders. Together, these research design features should minimize common method and common source concerns (Podsakoff et al., 2003).

Nevertheless, some study limitations deserve mention. Consistent with prior research (e.g., Bunderson et al., 2016), for example, we measured informal hierarchy strength based on team member ratings of dyadic influence, rather than using direct (e.g., behavioral) indicators. In doing so, we tapped into team members' perceptions about which other members were influential over them. It may be interesting to verify our results using behavioral observations in future studies. Similarly, although reliance on formal leaders' judgments of team creativity is an accepted and widely used approach (e.g., Shin & Zhou, 2007; Zhang, Tsui, & Wang, 2011), future research that corroborates the present findings using more objective measures of team creativity would be helpful to ascertain our results' robustness. Moreover, we collected all of our measures at the same time point and in one country (i.e., the Netherlands), using a correlational research design. As such, conclusions about causality and cross-cultural generalizability are not warranted, although our reasoning is predicated on a strong theoretical background and is not tied toward specific cultural considerations. Future research that constructively replicates our study using longitudinal or experimental designs and that corroborates our findings in different cultural contexts is required to address these issues.

Additionally, it may be worthwhile to consider possible connections between formal leadership and informal hierarchy strength. Past research suggests that empowering and supportive types of formal leadership may shape influence dynamics between team members, for example by increasing members' willingness to claim influence and informal leadership (Carson et al., 2007). For strong informal hierarchical *differences* to emerge, however,

asymmetrical dyadic influence relations need to be present within a team. Such asymmetrical influence relations only develop when one team member claims influence over another member, and the other member yields to the respective influence attempt. That is, if individual A can influence individual B, this implies that A has claimed *and* B has granted such influence (DeRue & Ashford, 2010). Although formal empowering leadership may stimulate individual team members' influence claiming, we see little reason to assume that this type of formal leadership will decisively shape members' decisions to grant informal influence to others. Consistent with the small and non-significant correlation between empowering leadership and informal hierarchy strength observed in our study, we therefore believe these two constructs represent distinct and largely independent phenomena.

Nevertheless, it would be interesting for future research to further disentangle formal leaders' role for the interpersonal dynamics of influence claiming and granting within their teams and, thus, for the development of informal team hierarchies. Building on theoretical work that has cast informal hierarchy as an important mechanism for reducing ambiguity and offering structure (Friesen et al., 2014; Tiedens et al., 2007), for example, one might expect that strong informal hierarchies are less likely to arise when formal team leaders exhibit directive behaviors that proactively provide such structure and clarity (cf. Lorinkova et al., 2013). With this type of formal leadership, it may appear less important for individual members to claim informal influence to structure team interactions. Also, to the extent such influence claims still occur, other members are less likely to grant informal influence in response (Tiedens & Fragale, 2003). Hence, asymmetrical informal influence relations are less likely emerge, potentially contributing to a negative association between formal directive leadership and informal hierarchy strength.

Lastly, future research may more closely examine possible mediators of the relationships observed in our study. Based on the MIP-G perspective, we have depicted

different team processes (e.g., participative decision-making, minority dissent, and constructive controversy) as key mechanisms linking informal hierarchy strength and team creativity. To better understand the role of informal hierarchy and the relative importance of different mediating processes, future research may therefore benefit from simultaneously incorporating a range of mechanisms associated with teams' motivated information processing. This may provide opportunities to pinpoint more precisely the processes through which empowering leadership can alleviate the potential downsides of strong informal team hierarchies uncovered in the present research.

CHAPTER 5

General Discussion

Informal hierarchies, defined as naturally developed influence differences between a groups' members, are a pervasive feature of groups and teams (Leavitt, 2004; Magee & Galinsky, 2008). Yet, despite the widespread presence of informal hierarchy, our academic understanding of the nomological network remains rather limited. In the present dissertation, I aimed to provide a more comprehensive understanding of the role of informal hierarchy in groups, by taking a broader look at potential antecedents and consequences of informal hierarchy strength. After reviewing previous research in this area, I identified specific research gaps and ambiguities that inspired the empirical research throughout the chapters. In Chapter 2, I addressed the question of when and why groups develop stronger or weaker informal hierarchies. Chapter 3 and 4 focused on two pivotal outcomes of informal hierarchy strength, namely group performance and creativity respectively. In both of these chapters, I included moderators of the informal hierarchy strength-outcome linkages to further specify the boundary conditions of informal hierarchy's effects.

In this concluding chapter, I will briefly summarize the findings of the empirical chapters and discuss how the respective conclusions advance past theoretical frameworks. I also provide recommendations about how this research can help groups that grapple with issues concerning their hierarchical organization. Lastly, I discuss how future research may build on this dissertation's findings to further broaden our understanding of informal hierarchy and I end with some concluding remarks.

Summary of Main Findings

Antecedents of informal hierarchy strength. Chapter 2's purpose was to identify antecedents of informal hierarchy strength. Drawing from the functionalist perspective, which has cast informal hierarchy as an essential mechanism for uncertainty reduction in groups,

(Friesen et al., 2014; Halevy et al., 2011), I proposed that groups develop stronger informal hierarchies in response to situations that lack clarity and direction, compared to situations that are well-defined and unambiguous. First and foremost, groups rely on their formal leaders to give them clear structure, prescribe roles, and monitor their efforts and performance (Bass, 1990; Somech, 2006). Hence, I argued that the absence of strong formal leadership would encourage groups to develop strong informal hierarchies, to help them structure tasks and enhance interpersonal coordination. Additionally, I proposed that the relationship between formal leadership and informal hierarchy strength would hinge on task complexity. High task complexity represents a situation in which the structuring function of either formal leadership or strong informal hierarchy is particularly desirable (Espinosa et al., 2007; Rousseau & Aube, 2010). Hence, I anticipated that formal leadership and informal hierarchy strength would be most strongly related under high task complexity.

In line with these propositions, results from both an experiment and two field studies revealed that formal leadership is an important predictor of informal hierarchy strength under conditions of high task complexity. Specifically, an experimental study demonstrated that groups developed stronger informal hierarchies when formal leadership was absent, compared to when formal leadership was present. A longitudinal field study extended this finding by demonstrating a non-reciprocal link between formal leaders' directive leadership style and informal hierarchy strength. Non-directive formal leaders, who give few instructions to group members and let them take charge themselves, stimulate groups to develop strong informal hierarchy. In contrast, when the formal leader takes charge and leads in a more directive manner, groups' hierarchical organization remains more egalitarian. Lastly, in a field study among a diverse set of organizational teams, I found that task complexity moderates the formal leadership-informal hierarchy relationship, such that this relationship only holds when task complexity is relatively high.

Informal hierarchy's relation with performance. In Chapter 3, I investigated critical assumptions underlying the functionalist and conflict accounts of hierarchy to explain the equivocal findings regarding the informal hierarchy strength-team performance linkage. Specifically, functionalist models of hierarchy assume that informal hierarchies are meritorious, meaning that group members' influence levels are aligned with their individual performance in the group (Anderson & Brown, 2010). In contrast, the conflict perspective postulate that informal hierarchies are more dominance-based (Cheng et al., 2013), meaning that influence levels of group members are aligned with their personal dominance, such that more dominant members occupy high-ranking positions, whereas more submissive individuals occupy lower hierarchical rank. Drawing from these assumptions, I proposed that in order to clarify informal hierarchy's relation with team performance, it is crucial to incorporate performance alignment and dominance alignment as moderators of the informal hierarchy-team performance link. Specifically, in line with functionalist thinking (Halevy et al., 2011), I argued that strong informal hierarchies would be beneficial for team performance when performance alignment is high. Yet, in line with conflict accounts (Greer et al., 2017), I argued that the detrimental effects of strong informal hierarchy would likely surface in dominance-based hierarchies.

I tested these ideas in a large-scale field study among a diverse range of teams and organizations. My theoretical model concerning performance and dominance alignment as moderators of the informal hierarchy strength-team performance relationship was partly supported. Specifically, results showed that informal hierarchy strength was positively related to group performance when performance alignment was relatively high, but not when performance alignment was lower. Contrary to expectations, however, the interaction of informal hierarchy strength and dominance alignment was not significant. Interestingly, the analysis revealed a main effect of dominance alignment, showing that dominance alignment

was negatively related with group performance, irrespective of group's informal hierarchy strength.

Informal hierarchy's relation with creativity. In Chapter 4, I went beyond the literatures' predominant focus on the relationship between informal hierarchy strength and immediate task performance, by focusing on team creativity as an alternative outcome. Both immediate task performance and creativity are crucial aspects of groups' overall success. Importantly, however, the specific group processes required to reach performance and creativity differ. Whereas immediate task performance often requires groups to engage in rather standardized habitual actions, creativity requires thoughtful engagement in information processing (Ford, 1996; Madjar et al., 2011). As such, I proposed that, despite informal hierarchy's positive relation with task performance, informal hierarchy could potentially stifle team creativity because of its negative relationship with creativity-related group processes (e.g., participation in decision making, minority dissent; De Dreu & West, 2001; Islam & Zyphur, 2005). Additionally, I expected that a group's formal leader could attenuate this negative relationship by demonstrating empowering leadership behaviors. Highly empowering leaders stimulate all group members to voice their opinion (Lorinkova et al., 2013), even when such members occupy low-ranked positions in the informal hierarchy. As such, the negative relationship between informal hierarchy and team creativity should disappear under high empowering leadership.

I examined these predictions in a field study among a diverse set of teams from different types of organizations and industries, and showed that informal hierarchies are indeed negatively related with team creativity. Importantly, as expected, the negative link between informal hierarchy and team creativity was only found under relatively low levels of empowering leadership, but not under higher levels of empowering leadership.

Theoretical Contributions

The nomological network around informal hierarchy. The findings of this dissertation advance new knowledge on the antecedents and consequences of informal hierarchy strength, outlining when hierarchies emerge more or less strongly, and how and when they relate to different group outcomes. Specifically, Chapter 2 extends prior outcome-oriented research by focusing on antecedents of informal hierarchy strength. By pointing to the joint impact of formal leadership and task complexity as predictors, these findings substantiate the theoretical notion that informal hierarchies emerge in response to uncertainty and lack of structure (Friesen et al., 2014; Halevy et al., 2011). Second, in terms of the outcome-side of the nomological network, this research clarifies the heretofore ambiguous relationship between informal hierarchy strength and team performance by identifying crucial moderators (i.e., performance alignment and dominance alignment). Lastly, Chapter 4 broadens the literature's current focus on team performance and offers important new insights about how informal hierarchy may relate to another crucial group outcome. Specifically, the findings demonstrate that informal hierarchy negatively associates with group creativity under low empowering leadership. Taken together, this dissertation allows for a more comprehensive perspective on the origins and consequences of informal hierarchy strength.

Formal and informal hierarchy. Much of the organizational research has focused on either formal hierarchy (e.g., March & Simon, 1958; Woodward, 1965) or informal hierarchical aspects (e.g., informal leadership, social networks; e.g., Carson et al., 2007; Kilduff & Brass, 2010), but rarely on the combination of these two fundamental elements of organization. As McEvily and colleagues note (2014, p. 303): "what is missed, is an integrated … understanding of organizational functioning in which formal organization and informal social structures are conceived of not in isolation, but in combination." Prior theorizing had pointed to the potential relevance of both formal and informal aspects of a

groups' hierarchy by discussing several potential models of how formal and informal hierarchy could be related. A sequential model would suggest, for instance, that formal aspects of hierarchies may be important precursors of informal hierarchies. Alternatively, a joint-effects model would suggests that formal and informal hierarchy together affect relevant outcomes (Diefenbach & Sillince, 2011; McEvily et al., 2014). Yet, both these potential models have rarely been systematically investigated in previous empirical work (Soda & Zaheer, 2012). By examining groups with and without formal leaders, and groups with different types of formal leadership, Chapter 2 demonstrates, in support of the sequential-model, that formal leadership is indeed an important antecedent of informal hierarchical aspects. Furthermore, by studying the interactive effect of informal hierarchy strength and empowering leadership on group creativity, Chapter 4 shows that formal and informal elements of hierarchical organization indeed have joint effects on key group outcomes. Hence, the findings of these chapters provide theoretical notions on the interplay between formal and informal hierarchy with empirical backing, and suggest that formal and informal hierarchies may indeed be interrelated in different ways.

Reconciling the functionalist and conflict perspectives. The results from this dissertation provide a way to partly reconcile contrasting theoretical perspectives on the benefits and detriments of informal hierarchy. Importantly, in line with the functionalist view (Halevy et al., 2011), Chapter 3 demonstrates that informal hierarchies can be helpful for groups. That is, when the functionalist assumption of meritocracy is met (i.e., when the highest performing members receive the most influence and lower performers receive less influence), a strong informal hierarchy positively relates with group performance. In contrast, in support of the conflict account of hierarchy (Greer et al., 2017), Chapter 3 demonstrates that informal hierarchies may also be detrimental. Specifically, the extent to which informal hierarchies are dominance-based, such that the most dominant individuals are most

influential, and submissive individuals have little influence, is negatively related with overall group performance, irrespective of informal hierarchy strength. These findings contribute to the theoretical debate on the consequences of informal hierarchy by revealing that it is not just hierarchical strength, but also its origins that determine whether informal hierarchy is helpful or harmful. In fact, the results highlight the importance of carefully considering underlying assumptions of the theoretical perspectives to reconcile conflicting notions about the functions and dysfunctions of hierarchy.

Another way in which both functionalist and conflict claims about informal hierarchy can be understood is by considering hierarchy's relationship with different types of outcomes. Put differently, both the functionalist and conflict perspective may hold merit, depending on the outcomes in which one is interested. Corroborating this notion, Chapter 4 demonstrates that, even though informal hierarchy may, under the right circumstances, positively relate with groups' immediate task performance, it may negatively relate with group creativity. As such, informal hierarchies are not universally beneficial or detrimental, but they are beneficial for some outcomes and detrimental for others.

Practical Implications

From a practical perspective, this dissertation provides several insights and recommendations for organizations dealing with issues around hierarchical organization. First, many organizations nowadays aim to reduce formal hierarchy in an attempt to make the workplace more egalitarian. Two prime examples of this move towards equality are organizations that adopt flat organizing structures without any supervisor-subordinate relationships (e.g., holacracy; Bernstein, Bunch, Canner & Lee, 2016), and organizations that install self-managing or autonomous teams in which formal supervisors mainly fulfill a coaching role (without being actively involved in groups' daily work; Lawler et al., 2001). Interestingly, the findings of Chapter 2 suggest that attempts at making groups formally more

egalitarian by reducing strong formal leadership may not have the intended effect of making groups more egalitarian. In fact, groups working on complex tasks are prone to develop strong informal hierarchies when they lack strong formal leadership. Paradoxically, this means that organizations may unintentionally replace one type of hierarchical differentiation (i.e., formal) with another (i.e., informal) when they remove or downplay formal leadership. Hence, organizations aiming to increase egalitarian working relationships among group members should keep strong formal leadership in place, and instruct formal leaders to create a well-defined working environment, allowing group members to work together as equals.

Despite contemporary organizations' distaste for hierarchical differentiation, this dissertation demonstrates that informal hierarchies are not necessarily problematic and may even be advantageous for groups. Under the right conditions, strong informal hierarchies are beneficial, and so instead of abolishing them, organizational decision-makers should enable groups to capitalize on their benefits. Specifically, Chapter 3 shows that when groups' influence distribution is based on members' individual performance, the clear downward flow of influence that characterizes strong informal hierarchy enhances group's overall performance. As such, these results suggest that organizational decision-makers should stimulate the emergence of strong meritorious informal hierarchies. They may achieve this, for instance, by facilitating group members' understanding of respective individual performances and they could promote granting influence to those group members who perform best. This method of carefully considering each group member's individual performance may also help to avoid the emergence of dominance-based hierarchies, which were found to negatively relate with team performance outcomes.

Lastly, Chapter 4 demonstrates that the right combination of formal leadership and informal hierarchy is essential for groups to reach their creative potential. That is, strong informal hierarchies do not stifle creativity as long as formal leaders buffer the potentially

negative effects of hierarchical differentiation by behaving in empowering ways. As such, groups with strong informal hierarchies may even benefit twice. When influence is meritoriously distributed, groups should be able to take advantage of the performance-enhancing effects of strong informal hierarchies, and still be able to reach creativity with the help of an empowering formal leader.

Strengths, Limitations and Future Research Directions

Strengths and limitations. The present dissertation has several strengths that are worth noting. First, all studies adopted a conceptualization of informal hierarchy as the overall structure of dyadic influence relations and accordingly employed a dyadic measurement. This means that informal hierarchy was treated as a relational phenomenon, and information was gathered on all potential influence relationships between members of participating groups. This method allowed for a precise and consistent depiction of how influence flowed throughout the groups under study. Second, the use of a multi-method approach (i.e., experiments and field studies) and different types of samples (i.e., students as well as employees in organizations) warrants confidence in the findings' internal and external validity.

Despite these notable strengths, there are also limitations that provide opportunities for future research. For instance, the empirical results from Chapter 3 and 4 are of a correlational nature and cannot be utilized to infer causality between the study variables. That is, one might argue that team performance and creativity inform group members' decisions on how to hierarchically organize, a line of reasoning that would reverse the direction of causality in the studies of both chapters. Yet, both chapters are built on strong theorizing and rely on moderation models, rendering reversed causality less likely (Evans, 1985). Nevertheless, future research may consider employing longitudinal, experimental, or quasi-experimental study designs to further corroborate the present conclusions. Second, all studies in this

dissertation utilized perceptual measures of the focal constructs (e.g., informal hierarchy strength, formal leadership, performance and creativity). Though this procedure reflects common practice in organizational research, more work is needed to ensure our findings hold when utilizing more objective indicators. Beyond addressing these limitations, the theory and findings presented in this dissertation suggest a number of interesting pathways for future investigation.

The nomological network around informal hierarchy. In line with this dissertation's general research interest, the different empirical chapters all concentrated on separate parts of the nomological network of informal hierarchy. Despite these insights, future research could further extend our knowledge about the emergence and effects of informal hierarchy by examining additional predictors and consequences. Future work could, for instance, emphasize the important functions that informal hierarchy fulfills in groups (based on the functional perspective; Halevy et al., 2011) and utilize these insights to identify more potential antecedent variables (i.e., next to formal leadership and task complexity). For instance, informal hierarchies have been argued to enhance efficient task performance (e.g., Ronay et al., 2012). By clarifying coordination and reducing potential for conflict, strong informal hierarchies allow for quick and decisive decision making in groups (Anderson & Brown, 2010; Halevy et al., 2011). Drawing from that logic, one could argue that group members engage in more hierarchically differentiating interactions (i.e., influence claiming and granting; DeRue & Ashford, 2010) and eventually develop stronger informal hierarchies in response to high time or performance pressure – as these represent situations in which groups should be able to capitalize most strongly on strong informal hierarchies' benefits.

In addition, future work might benefit from further specifying and extending the research on outcomes of informal hierarchy strength. One largely overlooked category of outcome variables are attitudinal outcomes, such as job satisfaction, organizational

commitment, and group identification (Greer et al., 2018). In the hierarchy literature, there seems to be considerable agreement among scholars that strong informal hierarchies should negatively relate with such outcomes (Greer & Van Kleef, 2010; Leavitt, 2004). That is, scholars assume that people have an "explicit distaste for hierarchy" (Gruenfeld & Tiedens, 2010, p. 1263), because of the inequality and unfairness that is associated with hierarchy (Friesen et al., 2014). Yet, considering that strong informal hierarchy can increase coordination, reduce conflict, and enhance group performance (Bunderson et al., 2016; He & Huang, 2011; Ronay et al., 2012), one might also expect positive effects on attitudinal outcomes in certain situations. For example, when strong informal hierarchy indeed improves overall group processes and enhances role clarity, it may increase morale among group members and enhance overall job satisfaction, organizational commitment, and group identification. Taken together, I would advise future scholars to incorporate group members' attitudes in future models on the consequences of informal hierarchy strength to further broaden our understanding of informal hierarchy's relationship with different types of outcomes.

Dyadic influence relations. Next to expanding the nomological network of the group-level phenomenon of informal hierarchy, it may also be worthwhile to move toward a lower level of analysis, unpacking how a group's influence dynamics unfold at the dyadic level. The current literature on influence dynamics within dyads highlights intrinsic factors (e.g., demographic traits and personality characteristics) as the most important predictors of who becomes influential over whom (Berger, Conner, & Fisek, 1974; Joshi & Knight, 2014). Importantly, however, this research has largely overlooked another crucial set of variables related to how influence and deference in dyadic interactions may take shape. Specifically, dyadic interactions in the group setting are not just affected by intrinsic factors of the focal interacting individuals, but also by social dynamics that are inherently present in the group

situation (Dugatkin & Early, 2003). Scholars in the field of ethology have long recognized the importance of such social dynamics and have demonstrated, for example, that dyadic interactions in groups are influenced both by other group members, as well as by the other dyadic interactions that take place in the group (Dugatkin & Early, 2003). For example, outcomes of an encounter between two group members may create winner and loser effects that subsequently influence these group members' other interactions (Mesterton-Gibbons, 1999). That is, when group member A becomes influential over member B, then this 'win' on behalf of A increases the chances of A becoming influential in future interactions with others (e.g., member C). And similarly, the 'loss' of member B increases the chances that member B will also 'lose' the battle for influence in future dyadic encounters. Additionally, the literature on social dynamics also identified bystander effects, which take shape when group member C is observer of the interaction between members A and B, and is affected by the outcome of that interaction in his/her future interactions (Dugatkin, 2001).

Importantly, this ethological research on social dynamic phenomena demonstrates that the differential presence of winner, loser, and bystander effects create informal hierarchies of different strength (Dugatkin, 1997). Hence, it would be interesting to extend prior investigations into dyadic interactions, as the foundation of informal hierarchy emergence, to also incorporate social dynamics (i.e., winner, loser and bystander effects). This would enable more precise predictions about how interdependent dyadic encounters ultimately result in different forms of hierarchical differentiation. Such research, in combination with the present findings, could take important steps towards better understanding the multilevel nature of hierarchical organization.

Temporal dynamics of informal hierarchy. Not only could future research broaden its scope towards different levels of analysis, it may also be worthwhile for future work to adopt a broader temporal framework. In line with current perspectives in the hierarchy literature, the

theorizing and empirical studies in this dissertation employed a rather static perspective on informal hierarchies – studying informal hierarchies at one point in time (though Study 2 in Chapter 2 is an important exception). Indeed, a more realistic picture would be that informal hierarchies are mutable and may change over time in response to contextual factors.

Drawing from the two primary theories on hierarchy, one could construct different hypotheses about the antecedents and consequences of dynamic hierarchical change. Drawing from the functionalist perspective one could postulate, for instance, that group members may engage in intentional hierarchy changes that are beneficial for overall group functioning (Halevy et al., 2011; Magee & Galinsky, 2008). For example, when confronted with different types of tasks or situations, groups may put different individuals (with different skillsets) in charge to enhance group performance through different phases of group life. Building on the conflict perspective, however, one could reason quite differently. This conceptual approach advances a view of hierarchy in which people continuously engage in social comparisons and will deliberately attempt to climb the ranks (Tarakci et al., 2016). As such, this perspective would suggest that informal hierarchies are constantly instable, though perhaps more so when situational cues stimulate competitive behavior among group members (Yu et al., 2019).

In sum, scholars could extend the current theoretical perspectives on informal hierarchy to include temporal dynamics and utilize these insights to inform empirical work on the stability of informal hierarchy over time. Such investigations could contribute to a better and more thorough understanding of the dynamic role of informal hierarchy in groups.

Concluding remarks

This dissertation enriches our understanding of the antecedents and consequences of informal hierarchy strength. Across three empirical chapters, I highlighted situations in which groups develop particularly strong informal hierarchies, and I studied informal hierarchy's conditional relationship with both team performance and team creativity. In doing so, this

dissertation advances existing knowledge on the nomological network around groups' informal influence hierarchy and allows for a more comprehensive understanding of the role of such hierarchical differentiation. Taken together, I hope these findings will help organizations to more effectively deal with issues around hierarchical organization and inspire future research on this important topic.

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SAMENVATTING

In vrijwel alle groepen en teams is sprake van een informele hiërarchie, gedefinieerd als de natuurlijk ontwikkelde invloedverschillen tussen groepsleden. Zelfs wanneer er geen formele verschillen zijn in de posities van groepsleden, ontwikkelen groepen door informele interacties vaak toch invloedverschillen die ervoor zorgen dat sommige leden het meer voor het zeggen hebben dan anderen. Hoewel informele hiërarchieën wijdverspreid zijn, kan de sterkte ervan variëren. Sommige groepen zijn sterk hiërarchisch, en hebben duidelijk hooggeplaatste groepsleden die invloed kunnen uitoefenen over de laaggeplaatste leden. Andere groepen hebben een zwakkere informele hiërarchie, waarin meerdere leden invloed kunnen uitoefenen en minder duidelijk is wie een hoge versus een lage positie heeft.

De literatuur kent twee belangrijke perspectieven omtrent de rol van informele hiërarchieën. De eerste is het functionele perspectief. Hierin wordt beargumenteerd dat een hiërarchie structuur biedt en rolduidelijk bevorderd, en daarom positief is voor groepsuitkomsten. Studies tonen bijvoorbeeld dat een sterke informele hiërarchie kan leiden tot betere coördinatie, minder conflict en hogere groepsprestaties. Aan de andere kant is er het conflict perspectief, waarin onderzoekers stellen dat een sterke informele hiërarchie negatieve effecten heeft. Onderzoek laat bijvoorbeeld zien dat mensen een sterke hiërarchie minder positief waarderen, en dat conflict juist hoger kan zijn in die situatie.

Hoewel beide perspectieven belangrijke inzichten opleveren, zijn er twee vraagstukken die het theoretisch begrip van informele hiërarchieën vooralsnog beperken. Ten eerste richt het empirisch onderzoek zich tot dusver hoofdzakelijk op de consequenties van informele hiërarchieën en is er weinig bekend over de voorspellers ervan. Dat betekent dat momenteel niet bekend is in welke situaties een informele hiërarchie zich in meer of mindere mate zal ontwikkelen, en hoe deze ontwikkeling beïnvloedt kan worden. Ten tweede is het onderzoek tot zover ambigu over de relatie tussen informele hiërarchiesterkte en belangrijke

groepsuitkomsten. Het functionele en conflict perspectief geven tegenstrijdige voorspellingen en ook empirisch onderzoek laat verschillende kanten zien.

In dit proefschrift adresseer ik deze twee vraagstukken. In Hoofdstuk 2 identificeer ik formeel leiderschap als belangrijke voorspeller van informele hiërarchiesterkte, en besteed ik aandacht aan de situaties waarin deze relatie in meer of mindere mate aanwezig is. In Hoofdstuk 3 focus ik op de relatie tussen informele hiërarchiesterkte en groepsprestaties, en identificeer ik belangrijke moderators die laten zien wanneer deze relatie positief dan wel negatief is. Vervolgens richt ik me in Hoofdstuk 4 op de vraag hoe informele hiërarchiesterkte samenhangt met een alternatieve groepsuitkomst die ook cruciaal is voor het algemeen functioneren van groepen, namelijk creativiteit. Gezamenlijk geven de verschillende hoofdstukken zo een meer compleet en genuanceerd beeld van de voorspellers en consequenties van informele hiërarchieën.

Antecedenten van Informele Hiërarchie

In hoofdstuk 2 onderzoek ik voorspellers van informele hiërarchiesterkte. Volgens het functionele perspectief is een sterke informele hiërarchie namelijk positief voor het bieden van structuur en rolduidelijkheid voor de groepsleden. Op basis van dit perspectief voorspel ik daarom dat een informele hiërarchie zich sterk zal ontwikkelen in ambigue, onzekere en onduidelijke situaties. Normaal gesproken zorgt een formeel leidinggevende voor het verdelen van rollen, het bieden van structuur en het creëren van zekerheid. Wanneer de formeel aangewezen leidinggevende deze rol niet of in mindere mate vervult, zullen groepsleden zelf met elkaar een sterke informele hiërarchie ontwikkelen om te voorzien in hun behoefte aan structuur.

Daarnaast beargumenteer ik dat de relatie tussen formeel leiderschap en informele hiërarchiesterkte afhangt van taakcomplexiteit. Hoge taakcomplexiteit is een situatie waarin de structurerende functie van ofwel formeel leiderschap, ofwel een informele hiërarchie,

belangrijk is. Daarom verwacht ik dat formeel leiderschap en informele hiërarchie het sterkst samenhangen onder hoge taakcomplexiteit.

De resultaten van drie verschillende studies bevestigen bovenstaande hypotheses. In een experiment laat ik zien dat groepen een sterkere informele hiërarchie ontwikkelen wanneer ze geen formele leider hebben, vergeleken met wanneer er wel een formele leider aanwezig is. In een longitudinale studie onder studententeams die vier weken werken aan een managementsimulatie, laat ik zien dat een directieve leiderschapsstijl ook voorspellend is voor informele hiërarchiesterkte. Hoe meer directief de formeel leidinggevende, hoe zwakker de informele hiërarchie. Als laatste laat ik in een veldstudie bij verschillende soorten teams in organisaties zien dat de relatie tussen formeel leiderschap en informele hiërarchie alleen standhoud bij hoge taakcomplexiteit. Alleen wanneer teams werken aan complexe taken, waarin de behoefte aan structuur en rolduidelijkheid meer saillant is dan bij simpelere taken, leidt de afwezigheid van sterk formeel leiderschap tot de ontwikkeling van een sterke informele hiërarchie.

Informele Hiërarchie en Teamprestatie

In hoofdstuk 3 onderzoek ik de tot dusver onduidelijke relatie tussen informele hiërarchiesterkte en teamprestatie. Het functionele en conflict perspectief hebben verschillende hypotheses over deze relatie, en ook empirisch onderzoek toont gemixte resultaten. Volgens het functionele perspectief is een sterke informele hiërarchie positief, omdat leden invloed geven aan de groepsleden die het beste presteren, terwijl minder invloed gaat naar teamleden die minder goed presteren. Een belangrijke onderliggende aanname binnen dit perspectief is dus dat een informele hiërarchie meritocratisch is.

Volgens het conflictperspectief is de relatie tussen hiërarchiesterkte en teamprestatie negatief. Mensen zouden het vervelend vinden dat een aantal ‘haantje de voorsten’ het voor het zeggen hebben in een groep, terwijl mensen met een minder dominante persoonlijkheid

moeten volgen. Deze redenering gaat ervanuit dat in een informele hiërarchie invloed samenhangt met dominantie, wat betekent dat de meest dominante mensen de hoogste posities hebben, minder dominante mensen een lagere positie, en meer submissieve individuen de laagste positie. Op basis van deze assumpties is mijn hypothese dat de relatie tussen informele hiërarchiesterkte en teamprestatie afhangt van prestatiesamenhang en dominantiesamenhang. Specifiek verwacht ik dat informele hiërarchiesterkte positief is voor teamprestaties onder hoge prestatiesamenhang (i.e., wanneer invloed samenhangt met individuele prestatie), terwijl deze relatie negatief zal zijn onder hoge dominantiesamenhang (i.e., wanneer invloed samenhangt met dominantie).

Om deze verwachtingen te toetsen verzamelde ik data bij verschillende soorten teams in organisaties. De resultaten laten zien dat informele hiërarchiesterkte inderdaad positief is voor prestaties wanneer de invloed van individuele teamleden samenhangt met hun individuele prestatieniveau. Met andere woorden, een heldere neerwaartse invloedverdeling is goed voor algemene teamprestaties wanneer de best presterende teamleden hoger in de hiërarchie zitten en de minder goede presteerders lager in de hiërarchie. De rol van dominantiesamenhang was echter anders dan verwacht. In tegenstelling tot de verwachting, was de interactie tussen informele hiërarchiesterkte en dominantiesamenhang niet significant. De resultaten laten zien dat dominantiesamenhang binnen het team op zichzelf voorspellend is voor teamprestaties, onafhankelijk van de sterkte van de informele hiërarchie.

Informele Hiërarchie en Teamcreativiteit

In Hoofdstuk 4 richt ik mij op een alternatieve, niet eerder onderzochte uitkomstvariabele: teamcreativiteit. Teamcreativiteit is net als teamprestatie een belangrijk onderdeel van het algemene functioneren van een groep, maar is nog niet bestudeerd in relatie tot informele hiërarchie. De theorie en het onderzoek over teamcreativiteit suggereren echter dat er hele andere processen voorafgaan aan teamcreativiteit dan aan directe teamprestatie,

wat zou kunnen betekenen dat de effecten van informele hiërarchieën anders zijn. De Motivated Information Processing in Groups-theorie (MIP-G) stelt dat groepen gemotiveerd moeten zijn tot diepgaande informatieverwerking om creativiteit te bereiken. Processen als participatie in besluitvorming en non-conformiteit in groepen zijn belangrijk om dit te stimuleren. Onderzoek suggereert echter dat sterke informele hiërarchieën deze processen negatief zouden kunnen beïnvloeden. Een sterke hiërarchie zorgt ervoor dat hogergeplaatste individuen eerder hun mening geven, terwijl lager geplaatste groepsleden geneigd zijn dingen voor zich te houden. Zelfs als laag gepositioneerde groepsleden hun meningen en ideeën zouden delen, deze waarschijnlijk minder serieus worden genomen door mensen hogerop in de hiërarchie. Om deze redenen is het waarschijnlijk dat informele hiërarchiesterkte negatief samenhangt met teamcreativiteit.

Naar verwachting hoeft de negatieve relatie tussen informele hiërarchie en teamcreativiteit echter niet altijd te bestaan. Als de groep een formeel leidinggevende heeft, die ervoor zorgt dat alle groepsleden worden gehoord en serieus genomen, dan kan de negatieve relatie tussen informele hiërarchiesterkte en teamcreativiteit verdwijnen.

Ik heb bovenstaande hypothese getoetst in een veldstudie bij verschillende soorten teams in organisaties. De resultaten geven aan dat groepen met een sterkere informele hiërarchie inderdaad minder creatief zijn wanneer zij een leidinggevende hebben die zich weinig richt op het stimuleren van creativiteit-relevante processen. In die situatie hebben groepen last van de creativiteit beperkende gevolgen van informele hiërarchie, en hebben ze geen formeel leidinggevende die dit negatieve effect kan beperken. Groepen met ofwel een zwakkere hiërarchie, ofwel een stimulerende leidinggevende, of beide, zijn in staat hogere niveaus van teamcreativiteit te bereiken.

Conclusies

SAMENVATTING

De bevindingen van dit proefschrift adresseren twee belangrijke vraagstukken in de literatuur. Ten eerste is Hoofdstuk 2 een van de eerste empirische studies naar de voorspellers van informele hiërarchie. Het hoofdstuk bevestigt het theoretische idee dat formeel leidinggevenden invloed hebben op hoe informele invloedsrelaties in groepen zich ontwikkelen, en toont ook wanneer dit wel of niet gebeurt. Daarnaast belicht Hoofdstuk 3 het idee dat informele hiërarchieën zowel positief als negatief kunnen uitpakken voor groepen, maar dat de precieze richting van de impact afhangt van hoe de hiërarchie is opgebouwd (i.e., gebaseerd op prestatie of dominantie). Tot slot laat ik in Hoofdstuk 4 zien dat informele hiërarchieën goed kunnen zijn voor taak gerelateerde groepsprestatie, maar dat het daarnaast ook negatief kan samenhangen met groepscreativiteit.

Vanuit praktisch oogpunt verschaft deze dissertatie de eerste handvaten voor organisaties om informele hiërarchieën te beïnvloeden. De resultaten van Hoofdstuk 2 laten zien dat formeel leidinggevenden hierbij een belangrijke rol kunnen spelen. Veel organisaties streven naar zoveel mogelijk gelijkheid tussen groepsleden, in bijvoorbeeld zelf managende of autonome teams. Dit proefschrift laat zien dat het belangrijk is in die situaties een sterke formeel leidinggevende aan te stellen, die zorgt voor duidelijk structuur zodat groepsleden niet onderling hoeven te bepalen wie de baas is. Daarnaast is een belangrijke conclusie dat een sterke informele hiërarchie zeker niet altijd vermeden hoeft te worden. Wanneer hiërarchie is gebaseerd op de juiste dimensies (i.e., individuele prestatie) kan het juist algemene groepsprestaties bevorderen. Daarnaast kan de formeel leidinggevende een belangrijke rol spelen als de groep alternatieve uitkomsten wil bereiken zoals teamcreativiteit.

In deze dissertatie onderzoek ik informele hiërarchie in groepen. In verschillende hoofdstukken laat zien wat de voorspellers en consequenties kunnen zijn, en wat de voorwaarden zijn voor bepaalde positieve en negatieve effecten. Ik hoop dat de bevindingen

van dit onderzoek organisaties helpen met issues rondom hiërarchische differentiatie en wetenschappelijk onderzoek stimuleert naar dit belangrijke onderwerp.

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vaak aan het feit dat ik eigenlijk nog heel weinig weet. Anke, als palliatief verpleegkundige, en Johan, als elektrotechnicus, jullie geven mij beiden soms een kijkje in een wereld waar ik niks van af weet en kunnen in een gesprek een perspectief geven waar ik zelf niet meteen aan denk. Bedankt voor jullie gezelligheid, levenswijsheid en liefde.

De levenslessen die ik leerde in huize Oedzes nam ik ook mee naar de middelbare school. Ik deed mijn best op het Lauwers College, en was een echte 'trochsetter'. Ik wilde graag hoge cijfers halen en koos ervoor om gymnasium te doen (terwijl ik heel slecht was in zowel Grieks als Latijn – maar ik had tevergeefs de hoop dat ook dit goede ding langzaam zou komen). In die periode maakte ik ook kennis met het uitgaansleven waarin ik succesvol bleek – althans, volgens mijn eigen definitie van succes op dat moment. Samen met mijn dierbare vriendinnen Hilde en Irene die ook in één of andere vorm hard werken met feestvieren wisten te combineren, maakten we het Lauwers College en menig Fryske kroeg onveilig. Lieve meiden, ik wil jullie bedanken voor een jarenlange trouwe vriendschap, en voor het gezamenlijk ontdekken dat ambitie, hard werken en plezier maken heel goed samengaan. Nu we elkaar al zo lang kennen, kunnen we gewoon bij elkaar thuis op de bank ploffen met een kop thee, een goed glas wijn, en bij voorkeur veel eten. Soms voeren we goede gesprekken, soms domme gesprekken, soms hebben we een heel programma aan activiteiten, en soms hangen we maar wat – het maakt allemaal niet uit, en dat voelt altijd als thuiskomen.

Na de middelbare school werd het tijd voor de universiteit, en in het tweede jaar van mijn studie bedrijfskunde verhuisde ik naar Groningen. Daar voelde ik me al snel als een vis in het water. Hoewel ik bij vrienden in Drogeham soms het gevoel had dat ze me wat 'veel' vonden, kwam ik er in Groningen achter dat mensen 'veel' juist leuk aan mij vonden. Zo leverde mijn bijbaan bij de Jumbo vriendinnen voor het leven op ("ik ben zo blij dat ik bij dit groepje hoor"), en sloot ik bij de studievereniging vriendschappen binnen de Boekenclub. Lieve Aletta, Inge, Jolinde, Jose en Martine; Floor, Kim, Nienke, Renée en Sjaak, bedankt

voor de geweldige studententijd die ik met jullie mocht beleven; maar ook de periode daarna waarin we gezamenlijk nieuwe levensfases met bijbehorende uitdagingen het hoofd boden (een eerste baan, het kopen van een huis, dertigersdillemmas, marathon lopen, trouwen, kinderen krijgen, kolven op het werk, loopbaanperspectief… je kent het wel).

Toen het snijden van vleeswaren en kaas bij de jumbo dusdanig routine was geworden dat ik om me heen kon kijken tijdens het werken, kwam Jarno (broodafdeling) in beeld. Na een avond gezamenlijk feest vieren in de stad sloeg de vonk definitief over, en vanaf het begin van onze relatie waren we onafscheidelijk. Tijdens het schrijven van het proefschrift kon ik altijd op je rekenen. Zo ging ik bijvoorbeeld mijn presentatie voor het SOM-congres thuis oefenen met jou als kritisch publiek. Na een verhandeling over het effect van informele hiërarchie op teamcreativiteit, en de rol van leiderschap vroeg ik: “en… wat vond je ervan?” Je letterlijke antwoord luidde: “Ik heb het gevoel dat je een beetje een open deur intrapt…” Zo houden we elkaar scherp zal ik maar zeggen. Een andere praktische toevoeging die je leverde was het controleren van mijn blogs voor de expertise centrumwebsite. Die moesten in het Nederlands worden geschreven, en dat kan de master Nederlands recht (jij) iets beter dan de (bijna) dr. organizational behavior (ik). Bij de derde of vierde blog die ik je liet lezen zei je op een gegeven moment: “je wordt er wel steeds ietsje beter in hoor”. Fijn om te horen. Ook dit dankwoord (exclusief deze en volgende alinea) heb je met een kritisch oog van feedback voorzien.

Het belangrijkste dat je echter hebt betekend voor mijn proefschrift is je onvoorwaardelijke steun en vertrouwen. Hoewel je thuis weleens zegt: “Schat, breek daar je mooie hoofdje maar niet over” ben je er tegelijkertijd van overtuigd dat ik een geweldige wetenschapper ben. En je mag dan niet in de beoordelingscommissie zitten, het was toch fijn om te weten dat in ieder geval één persoon daarvan overtuigd is. Nu we samen een gezin hebben is het soms puzzelen om twee banen en privé altijd goed op elkaar af te stemmen,

maar ik heb het gevoel dat we elkaar op de juiste momenten ruimte geven – en dat dat goed werkt. Bedankt lieve Jarno.

Ook wil ik graag mijn schoonouders, Henk en Jolien, bedanken voor hun belangstelling in wat ik nou allemaal aan het doen ben daar op de universiteit. Hopelijk heeft dit boek jullie een duidelijker beeld gegeven daarvan – al kan ik me ook voorstellen dat het tegenovergestelde waar is. Ook wil ik jullie bedanken voor jullie steun aan ons gezin en de geweldige opa en oma die jullie zijn voor Fedde.

Na het halen van de bachelor bedrijfskunde ging ik voor de onderzoeksmaster human resource management. Tijdens deze studie koos ik voor een onderzoeksproject onder begeleiding van Floor. Achteraf gezien een bepalende keuze, die in gang heeft gezet dat ik uiteindelijk zou gaan promoveren. Floor, we konden vanaf het begin goed met elkaar overweg. We houden allebei van praten, dus onderzoeksbijeenkomsten gingen lang niet altijd alleen over onderzoek, maar ook over allerlei andere dingen (jouw gezin, mijn toen-nog studentenleven). Je bent een belangrijk rolmodel geweest, die me heeft laten zien dat de wetenschap niet alleen maar ‘stoffig’ is (met idem ‘stoffige’ mensen). Tijdens, of net na dit onderzoeksproject stuurde je mij op 8 februari 2012 een email met het voorstel om met Frank een OT-voorstel in te dienen bij NWO. In de email stond een lijstje met vijf redenen waarom dat een mooie kans voor mij was – waaronder: de randstad lonkt waarschijnlijk, maar er gaat niets boven Groningen (mee eens). Je bleek een overtuigende schrijver, want hoewel ik voor dat moment niet van plan was om te gaan promoveren, was ik toch enthousiast over dit specifieke voorstel.

Floor, ik wil je bedanken voor de belangrijke rol die je hebt gespeeld in mijn wetenschappelijke carrière. Tijdens het eerste onderzoeksproject, de master scriptie, en tijdens het schrijven van mijn proefschrift ben je een betrokken begeleider geweest, zowel inhoudelijk als persoonlijk. Tijdens vergaderingen over het onderzoek was je op detailniveau

op de hoogte van de studies, de resultaten en de status van de papers; na de vergaderingen kwam je vaak nog even langs voor een informeel gesprek over mijn welzijn. Al vrij snel tijdens het promoveren was je ook nog de enige begeleider die direct aanwezig was op de gang op de derde verdieping, en dus liep ik soms bij je binnen voor wat schrijf-inspiratie en een peptalk. Gelukkig weet je een onderzoeksvraag altijd interessant te maken met een verhaal eromheen. Als ik vast zat met schrijven klopte ik soms even bij je aan om te horen hoe jij het zou aanvliegen. Daarnaast heb je me altijd geholpen met het navigeren in de sociale omgeving van de wetenschap. Bij wie moet je zijn voor een labaanvraag, wie regelt X, of wie moet je aanschieten als je Y wil bereiken.

Tijdens de OT-voorstel-fase kwam ik in contact met Frank. Frank, ik vond ook jou niet ‘stoffig’, maar je voldeed wel iets meer aan het plaatje van de stereotype wetenschapper. Je liep over van enthousiasme over het onderwerp informele hiërarchie, leek heel gelukkig te worden van statistiek en cijfers, en had praktisch elk wetenschappelijk artikel over leiderschap, hiërarchie, en gerelateerde zaken gelezen en gememoriseerd (en uitgeprint, en volgens een zeer nauwkeurig systeem opgeborgen in ordners in je kantoor). Ik wil je bedanken voor je geweldige begeleiding al die jaren. Je hebt mij allerlei belangrijke dingen geleerd – waaronder soms hele praktische statistische vaardigheden zoals het berekenen van een ICC. Je belangrijkste bijdrage is wellicht op het gebied van schrijven. Ik weet nog dat je me vroeg om destijds voor het OT-voorstel een persoonlijke motivatie te schrijven. “I discovered the importance of scientific research for the generation of new knowledge”, schreef ik destijds. Onder jouw bezielende leiding werd deze zin uiteindelijk: “I am excited about working at the frontiers of knowledge and contributing new insights that help to push forward this boundary.” Als ik nu een paper aan het schrijven ben zit er een soort van Frank-Walter-stem in mijn hoofd, die mij waarschuwt als ik één van mijn veelvoorkomende fouten maak. Die stem zegt dingen als: “this completely falls from the sky” als ik zonder goede

introductie over een nieuw onderwerp begin; of “inconsistent use of tempi” als ik per ongeluk switch van tegenwoordige naar verleden tijd of vice versa. Als een zin niet helemaal lekker loopt zegt de stem “awk” (awkward phrasing). Niet alleen de manier van schrijven, maar ook de inhoud van de argumentatie is iets waar je altijd scherp op bent geweest, en ik kwam nooit weg met een half uitgelegd moderatie-effect. Van deze eeuwige kritische blik heb ik heel veel geleerd, bedankt daarvoor.

Tijdens de research master volgde ik ook het vak Organizational Behavior van Gerben, die uiteindelijk mijn promotor zou worden. Tijdens dit vak schreef ik mijn eerste paper over het onderwerp informele hiërarchie, getiteld: “Hierarchy linearity and stability: Discovering diffuse and specific status characteristics”. Gerben, wat jou wellicht het meest een ‘typische wetenschapper’ maakt is je soms wat wilde bos met grijze haren, en je onuitputtelijke kennis over een breed scala aan onderwerpen (wellicht consequentie van het feit dat je graag in het weekend wetenschappelijke literatuur bijhoudt). Gerben, vanaf het begin van het promotietraject gaf je me volledige autonomie in het onderzoek: het was vooral mijn onderzoeksproject en ik was de baas. Als ik aan het twijfelen was over de juiste keuze in een bepaalde fase van het onderzoek, sprak je vertrouwen uit in mijn capaciteit om zelf de juiste afwegingen te maken. Bedankt daarvoor, dat vertrouwen gaf mij ook vertrouwen. Je was ook altijd praktisch over het onderzoek en de resultaten, wat prettig was. Tijdens vergaderingen over het onderzoek kwamen er allerlei ideeën boven tafel, maar je vond het belangrijk ook altijd de praktische haalbaarheid in overweging te nemen.

Bovenstaande betekent op generlei wijze dat je een ‘laissez faire’ leider was, want je was betrokken en deed een stap extra wanneer nodig. Al in de eerste maand van mijn aanstelling bij de universiteit was er een incident met één van de deelnemers aan mijn eerste veldstudie. Ik weet nog goed dat je toen meteen actie ondernam, zonder mij verder een negatief gevoel daarover te geven (het voorval was op zichzelf al vervelend genoeg). Veel

later tijdens het promotietraject zat het een tijdje tegen met data en analyses, en kon ik het tijdens een vergadering niet meer drooghouden (ik wil benadrukken dat ik op dat moment zwanger en hormonaal was). Ook hier nam je meteen een prominentere rol door me weer op weg te helpen met een aantal concrete ideeën en analyses.

Net als Floor heb je een belangrijke rol gespeeld in mijn keuze om in de wetenschap te blijven werken. Na het starten van het promotietraject ben ik lange tijd in ontkenning geweest over mijn wetenschappelijke aspiraties en riep in de eerste jaren regelmatig: “Leuk hoor zo’n proefschrift, maar als het af is ga ik wat anders doen”. Uiteindelijk kon ik toch je aanbod om nog drie jaar te blijven voor een aantal meer praktische onderzoeksprojecten niet afslaan, en hebben we ook vastgesteld dat het tijd was voor mij om als wetenschapper uit de kast te komen. Gerben, bedankt voor alles wat je me hebt geleerd tot zover, en ik kijk uit naar de samenwerking de komende jaren.

Tijdens mijn aanstelling als promovenda heb ik ook veel onderwijs mogen verzorgen. Deze afwisseling van onderzoek en onderwijs heb ik altijd fijn gevonden. Ik zou graag alle studenten die ik heb mogen begeleiden bij het schrijven van hun scriptie bedanken voor hun inzet en inspiratie. Het was leuk om te zien hoe studenten enthousiast raakten over ‘mijn onderwerp’, maar nog leuker om te zien hoe ze daar vervolgens hun eigen draai aan gaven.

Bij de afronding van het proefschrift hoort ook een beoordelingscommissie. Ik zou graag de leden van mijn commissie, Janka Stoker, Rafael Wittek en Gerben van Kleef bedanken voor hun tijd en feedback. Ik kijk ernaar uit om met jullie van gedachten te wisselen over het proefschrift op 9 april.

Ik wil ook graag al mijn collega’s bij de vakgroep HRM & OB bedanken voor het ofwel bijdragen aan mijn academische vorming, ofwel het simpelweg leuk en gezellig maken van mijn dissertatie-tijd (of beide). Met velen van jullie heb ik leuke dingen meegemaakt en het is een beetje gevaarlijk om te beginnen en dan straks mensen of herinneringen over te

slaan. Maar ik kan het toch ook niet laten: Roxana en Elena, thank you for the first conference-experience at APS in San Fransisco and for the amazing road trip through California that followed; Joost, bedankt voor het gezellige Ingroup congres en samen hipsters spotten in Helsinki; Bedankt, Frederik en Jessica voor het gezellig stiekem peukjes roken bij borrels en partijen; Eric, bedankt voor het geweldige surveilleer-voorbeeld dat je was bij de tentamens van GIO en OB; en Bernard en Tim, bedankt voor samen het spreekwoordelijke licht uit doen in de Pintelier; Yan and Ye, thank you for visiting my house and enjoying cheese fondue with me (and doing the dishes afterwards). Bedankt, Tineke en Susanne, voor de gezellige nacht voetjes van de vloer in de Twister; Katinka, bedankt voor het gezamenlijk opscheppen over hoe geweldig onze (klein)kinderen zijn; Maxim, bedankt dat je de barman in Chicago ging leren hoe je de perfecte cocktail maakt; en bedankt Bart, Rachel en Gerben dat ik mocht meeliften op jullie pubquiz-kennis.

Naast al deze fantastische collega's is er één iemand die eruit springt en die absoluut een hele paragraaf (of eigenlijk boek) verdient. Toen ik op 1 september 2013 officieel aan de slag ging bij de vakgroep HRM & OB gebeurde er namelijk iets geweldigs: ik werd ingedeeld in een kamer met Sanne. Inmiddels zitten we al zes jaar lang, 40 uur per week tegenover elkaar aan ons bureau. Ik kan me niet herinneren dat we ooit een meningsverschil hebben gehad – we zijn het juist altijd roerend met elkaar eens. Over wetenschap, over de opvoeding van kinderen, over feminisme, racisme (en andere –ismes), over vegetarisch en biologisch eten, over de onzin van gestrest zijn, over de temperatuur in onze kamer, over waar de planten in ons kantoor komen te staan, over welk onderwerp er ook maar aan bod komt. Waar we het ook over eens zijn is dat vrije wil niet bestaat. We hebben gemerkt dat door de hoeveelheid tijd die we met elkaar doorbrengen onbewust allerlei grote levenskeuzes op elkaar zijn afgestemd. We hebben beide op dezelfde momenten drie keer ons contract laten verlengen voor steeds precies dezelfde periode. Uiteindelijk hebben we na zes jaar in dezelfde week de

laatste letters van ons proefschrift geschreven. We hebben beiden ons eerste artikel gepubliceerd in hetzelfde journal. We zijn allebei moeder geworden tijdens de promotie. We zijn er een tijd geleden achter gekomen dat we dezelfde shampoo gebruiken, en tijdens het laatste vakgroepuitje waren mensen ervan overtuigd dat we onze outfits op elkaar hadden afgestemd (wat niet zo was). Sanne, ik kan niet anders zeggen dan dat ik er een geweldige vriendin bij heb. Ik wil je bedanken voor de geweldige tijd samen, de goede gesprekken en de dingen die ik van je heb geleerd. Je bent kritisch, hebt een onfeilbare logica en vaak een verfrissend perspectief op dingen die veel mensen als normaal of logisch beschouwen. Ik ga ervanuit dat we samen de wereld nog lange tijd zullen proberen te doorgronden en verbeteren.

Als laatste bedank ik Fedde. Het is een cliché in het dankwoord van menig wetenschapper, maar het is waar: zonder jou, lieve Fedde, was dit proefschrift waarschijnlijk veel eerder af geweest. Maar ik zou het absoluut niet anders willen. Na een dag werken is er niks fijners dan samen thuiskomen, de duplo-spoorlijn weer op te bouwen, samen het huis op stelten te zetten, of door de buurt te wandelen om verderop in de straat bij de glaafsiene te kijken. Je helpt mij de onbenullige problemen op het werk te relativeren, en laat me elke keer weer zien wat echt belangrijk is in het leven. Lieve Jarno en Fedde – ik hou van jullie.